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PUBLICATION NOTE

By a change in the By-Laws of the Biological Society of Washington, effective March 27, 1926, the fiscal year now begins in May, and the officers will henceforth hold office from May to May. This, however, will make no change in the volumes of the Proceedings, which will continue to coincide with the calendar year. In order to furnish desired information, the title page of the current volume and the list of newly elected officers and committees will hereafter be published soon after the annual election in May.

All correspondence should be addressed to the Biological Society of Washington, % U. S. National Museum, Washington, D. C.

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The Committee on Publications declares that each paper of this volume was distributed on the date indicated on its initial page. The contents, minutes of meetings, and index for 1954 (pp. v–x, 289-301) were issued on April 22, 1955. The title page and lists of officers and committees for 1954-1955 (pp. i–iv) were issued on the same date.

ERRATA

p. 119, line 24, for "sepcies" read species.

p. 120, line 23, for "epdiermis" read epidermis.

p. 124, line 1, for *"baalastense"* read *ballastense.*

p. 128, line 10, delete "(Gardner, 1948:242)".

p. 128, last line, for "Fossile" read Fossils.

p. 137, line 30, for *"kierneri"* read *kieneri.*

p. 143, line 5, for "Curvier's" read Cuvier's.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

PROCEEDINGS

The Society changed its schedule of meetings, reducing them to two a year, one in the spring and one in the fall. These are in addition to the annual meeting, which is purely a business meeting.

1016th Meeting—April 12, 1954

President Deignan in the chair; 75 persons present. Meeting held in the Auditorium of the U. S. National Museum.

Informal Communication: S. F. Blake, Exhibition of O. M. Freeman's Annotated list of the plants growing naturally at the National Arboretum.

Formal Communication: Ernst Mayr, Some problems of speciation.

1017th Meeting—May 24, 1954

75th ANNUAL MEETING

President Deignan in the chair; 19 persons present.

New member elected: Edmund H. McNally.

The reports of the Recording Secretary, Corresponding Secretary, and Treasurer were read.

An informal report for the Editorial Committee was presented.

The following officers and members of council were elected: President Herbert G. Deignan; Vice Presidents, Hugh T. O'Neill, Alan Stone, Herbert Friedmann, Howard B. Owens; Recording Secretary, S. F. Blake; Corresponding Secretary, Gormon M. Bond; Treasurer, Allen J. Duvall; Members of Council, David H. Johnson, Louise M. Russell, Maurice K. Brady, Albert C. Smith, Charles O. Handley, Jr.

1018th Meeting—November 18, 1954

Joint meeting with Washington Academy of Sciences, in Assembly Hall of the Cosmos Club.

Formal Communication: Konrad Z. Lorenz, Max-Planck Institute: Mechanisms and releasers in animal behavior.

Vol. 67, pp. 1-16 March 22, 1954

PROCEEDINGS
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A MISCELLANY OF NEW TINGIDAE (HEMIPTERA)

By Carl J. Drake, *Ames, Iowa*

The present paper contains the descriptions of one new genus and 22 new species of Tingidae. For the loan of many specimens I am greatly indebted to Dr. W. E. China of the British Museum (Natural History, London) and to Dr. A. Soos of the Hungarian National Museum (Budapest). I am also indebted to Dr. A. Schouteden of the Musée Royal du Congo Belge (Tervuren, Belgium) for the gift of the type of *Tingis australis* Montrouzier from New Caledonia. The types of the new species have been deposited in the collections as stated under the various descriptions. In the comparative measurements, 80 units equal one millimeter.

Monanthia imparis, n. sp.

Large, brown, with some veinlets black-fuscous. Pronotum deep black, coarsely punctate, the posterior process areolate, brown with some dark fuscous; carinae brownish, uniseriate; median carina a little higher on disc, then quite low and without areolae on hind process; lateral carinae long, subparallel, short and divergent posteriorly on hind process. Paranota moderately wide, long, reflexed, mostly triseriate, resting flatly on the anterior surface of the pronotum and there concealing lateral carinae; opposite humeral angles with the outer row of areolae turned down, the second row elevated and the first or basal also raised so as to form a narrow longitudinal elevation which makes the outer margin on disc deeply longly concave and considerably removed from lateral carinae.

Head black, with five testaceous spines, the median and frontal spines very short, the hind pair long and appressed. Rostum brownish, extending to base of mesosternum; laminae testaceous. Bucculae contiguous in front. Antennae brownish with terminal segment black, measurements—I, 12; II, 12; III, 70; IV, 22. Body beneath deep black. Hypocostal laminae uniseriate. Legs brown with femora fuscous. Discoidal area concavely widened in apical half, extending to middle of elytra, with outer boundary vein in apical half extending rather deeply and concavely into subcostal area, rounded at the apex, widest a little before the apex (middle of concavely widened area), there five or six cells deep, the outer boundary vein slightly elevated near the middle, between there and slightly raised apical part concavely impressed; subcostal area mostly triseriate, biseriate along widened part of discoidal area; costal area rather wide, mostly uniseriate, biseriate at base and then again in widest part beyond apex of discoidal area, with many of the cross veinlets enlarged and infuscate, the areolae clear; sutural area with large areolae and many veinlets infuscate.

Length, 3.50 mm.; width, 1.65 mm.

Type (female), Ngong, Kenya Colony, Africa; Hungarian National Museum (Budapest). *Paratype:* 1 specimen (head wanting), same locality as type.

This large species may be distinguished by the distinctly concave outer margin (on disc) of the reflexed paranota and the shape of the discoidal area.

Monanthia aurigana, n. sp.

Small, testaceous with head, pronotum, broad median bands on all femora, last tarsal segment and body beneath intensely black; paranota testaceous with narrow basal margin at humeral angles black and visible from dorsal aspect; elytra with veinlets of subcostal, discoidal and sutural areas largely brown or fuscous. Cephalic spines moderately long, whitish, appressed. Antennae testaceous with fourth segment black, measurements—I, 10; II, 8; III, 62; IV, 21. Bucculae intensely black, broad, with hind margin whitish. Hypocostal laminae uniseriate. Rostrum brown, extending to base of mesoternum.

Pronotum moderately convex, with large, reflexed paranota concealing almost all but collar, median carina and triangular process; under paranota black and punctate; carinae pale testaceous, uniseriate; lateral carinae slightly converging anterior, present only on hind process, terminating anteriorly just under reflexed paranota; collar testaceous, slightly raised at middle. Discoidal area extending to middle of elytra, slowly widening to basal third, then a little concavely widened with apex broad and obtusely angulate, four areolae deep in widest part of apical third; subcostal area mostly biseriate, triseriate just behind discoidal area; costal area composed of one row of moderately large, clear areolae.

Length, 2.25 mm.; width, 1.00 mm.

Type (male) and *allotype* (female), Shepstone, Natal, South Africa, June 6, 1897, R. H. Turner; British Museum. *Paratypes:* 22 specimens, same data as type.

Allied to *M. caffara* Stal, but distinguished from it by the raised and angulate apex of discoidal area and broadly annulate femora. In *caffara* the legs are brownish and the apex of discoidal area broadly rounded and not elevated. *M. femoralis* Stal from Africa has the femora entirely black, also the first two antennal segments.

Monanthia aurigana discoris, n. subsp.

Differs from typical form by larger size, wider discoidal area apically, with apex scarcely raised and broadly rounded and the biseriate costal area in apical third. Length, 2.75 mm.; width, 1.25 mm.

Type (female), Lindi, Tanganyika Territory, Africa; Drake Collection.

Physatocheila exolasca, n. sp.

Large, brown, without color markings, with areolae of costal area clear. Head with five brown spines, median and frontal pair moderately long, semi-erect, the hind pair long, appressed; eyes large, black. Antennae moderately stout, brown with last segment black, measurements—I, 14; II, 11; III, 94; IV, 30. Bucculae long, closed in front, areolate. Rostrum testaceous, with apex barely touching base of abdomen; laminae testaceous, areolate, parallel, open behind. Orifice with prominent chan-

nel. Hypocostal laminae with one row of rounded areolae. Legs brown. Venter reddish brown, the sternum mostly black.

Pronotum moderately convex, coarsely closely punctate, retecious, tricarinate; carinae uniseriate, the areolae tiny and not very distinct; lateral carinae feebly less elevated than median, very slightly convergent anteriorly, the anterior ends concealed by reflexed paranota; paranota long, wide, completely reflexed, with outer margin slowly rounded behind, not quite reaching to lateral carinae on disc, barely concealing lateral in front; hood low, very little elevated. Elytra widest in front of middle, constricted beyond the middle, then scarcely widened apically; costal area wide in basal three-fifths, two cells deep at base, then three deep to beyond the middle of discoidal, then biseriate, uniseriate and slightly paler in apical third, the areolae hyaline; subcostal area biseriate; discoidal area large, three-fifths as long as elytra, narrowed at both ends, with outer boundary vein a little sinuate, widest at middle, there nine cells deep; sutural area with cells a little larger apically.

Length, 4.00 mm.; 1.62 mm. wide.

Type (male), Dehra Dun, U. P., India, Oct. 12, 1951, R. Kutheri; Drake Collection.

Similar to *P. orientalis* Drake in size, color and general aspect, but easily separated from it by the less elevated hood and especially by the narrower apical third of elytra.

Cysteochila cracentis, n. sp.

Elongate, slender, brown with elytra more testaceous-brown. Head with four short spines, the median absent. Rostrum long, brown with black tip, nearly as long as channel; channel deep, nearly parallel-sided, open hind, the laminae testaceous, areolate. Bucculae long, areolate, contiguous in front. Orifice with a short pale channel. Hypocostal laminae uniseriate. Legs rather short, slender, clothed with very short pale hairs. Antennae moderately long, clothed with short pubescence, measurements—I, 15; II, 12; III, 110; IV, 25. Venter dark fuscous; underside of thorax brown.

Pronotum moderately convex, tricarinate; median carina with one row of small areolae; lateral carinae concealed (save behind pronotal disc) by reflexed paranota, the exposed part on triangular process as high as median carina; hood slightly indicated, feebly elevated, with front margin slightly concave; paranota large, strongly reflexed, resting on (or nearly in contact) with surface of pronotum, long, with outer margin slowly rounded and slightly separated from median carina. Elytra very long, narrow, slightly constricted behind middle, much longer than abdomen; costal area narrow, reflexed upright, uniseriate, with transverse veinlets brown, the areolae very small; subcostal area much wider, biseriate, with fairly large areolae; discoidal area elongate, scarcely extending beyond middle of elytra, four or five areolae deep at middle; sutural area very long, with areolae scarcely larger than in discoidal, some veinlets infuscate. Wings fumose, a little shorter than elytra.

Type (male), Yancep, West Australia, 32 miles north of Perth, Dec. 20-31, 1935, R. E. Turner; British Museum.

The very long and narrow form, narrow and reflexed upright costal area, long rostrum and rather short and tumid pronotum (not including

hind process) distinguish this species from other members of the genus in Australia.

Cysteochila dikoana, n. sp.

Broad, brown with pronotum dark fuscous-brown, the elytra more testaceous-brown with a rather broad, transverse, reddish brown fascia near the middle of costal and subcostal areas, which then broadens so as to include most of discoidal area. Antennae testaceous with first two and last segments fuscous-brown, measurements—I, 14; II, 10; III, 85; IV, 27. Head reddish brown, with five spines; median and anterior spines very short; posterior pair long, testaceous, appressed; bucculae broad, with ends meeting in front. Rostrum long, testaceous, not quite attaining end of sulcus; laminae broad, uniseriate, whitish. Hypocostal laminae uniseriate. Body beneath reddish brown. Legs testaceous, femora with a rather broad, reddish brown or fuscous band at the middle.

Pronotum broad, moderately convex, coarsely punctate, concealed largely by reflexed paranota, tricarinate; median carina with one row of small areolae, lower on hind process and there without areolae; lateral carinae visible on hind process, there convergent anteriorly and concave within. Elytra broad, with mostly clear areolae; costal area wide, mostly biseriate, triseriate in widest part opposite apex of discoidal area; subcostal area narrower, biseriate; discoidal area large, about two-thirds as long as elytra, narrowed at both ends, with outer marginal vein sinuate, widest at middle, there seven areolae deep.

Length 3.50 mm.; width, 1.62 mm. wide.

Type (female), Dikoa, Nigeria, Nov., 1924; in Drake Collection. *Paratypes:* 4 specimens, same locality as type.

Separated from other African species by the wide costal area (partly triseriate), banded femora of all legs and broad form of body.

Cysteochila endeca, n. sp.

Slender, brown with costal area and collar pale testaceous. Head black, with five testaceous spines. Antennae very shortly pubescent, testaceous with first two segments brown and fourth largely fuscous, measurements I, 10; II, 8; III, 76; IV, 22. Bucculea testaceous, closed in front. Orifice with prominent, testaceous channel. Rostrum brown, extending to middle of mesoternum; laminae testaceous, uniseriate, more widely separated and cordate on metasternum. Legs brown with tibiae testaceous. Hypocostal laminae testaceous, composed of one row of elongate cells.

Pronotum black, considerably convex, tricarinate, the posterior process brown and areolate; each carina foliaceous, uniseriate, the exterior vein costate; collar elevated at the middle so as to form a small tectiform hood; paranota wide, reflexed, inflated but with the outer margin resting on the pronotal surface about midway between lateral and median carinae. Discoidal area two-thirds as long as eyltra, with outer boundary vein nearly rectate, narrowed at both ends, widest at middle, there four or five areolae deep; subcostal area biseriate; costal area very narrow, composed of one row of narrow, long cells.

Length, 2.80-3.00 mm.; width, 0.90 mm.

Type (male) and *allotype* (female), Bambey, Senegal, Africa, Dec. 29, 1942, on manguier, J. Risbec; British Museum. *Paratypes:* 1 specimen taken with type; 1 specimen, Bungalow, Acara, Gold Coast, Dr. J.

W. Scott Maclifie; 1 specimen, Kampala, Uganda, Nov. 11, 1938, H. Hargreaves. One specimen also from Port St. John, Pondoland, Cape Province, South Africa.

Distinguished from *C. natalensis* Stal by the slenderer form, neater reticulations, more uniform color, more convex pronotum and more tumid paranota. The pubescence of the antennae is also shorter and quite inconspicuous.

Cysteochila munda, n. sp.

Elongate, brown with eyes black and most of fourth antennal segment and tips of tarsi dark fuscous; body beneath dark fuscous. Bucculae whitish testaceous, areolate, contiguous in front. Rostrum brownish with terminal segment blackish; laminae strongly foliaceous, testaceous, with high areolae. Hypocostal laminae whitish testaceous, composed of one row of small rounded areolae. Orifice with pale canal. Antennae indistinctly pubescent, measurements—I, 12; II, 8; III, 100; IV, 40. Head dark brown, with five moderately long, testaceous spines. Hood moderately large, inflated.

Pronotum moderately convex, punctate, tricarinate, posterior process paler and areolate; paranota strongly reflexed, concealing most of lateral carinae, not touching median carina, raised slightly above pronotal surface; median carina composed of one row of small areolae; lateral carinae concealed on disc and in front by reflexed paranota, uniseriate, divergent posteriorly, all carinae with fine pale hairs on both sides. Elytra constricted a little beyond the middle, considerably longer than abdomen; costal area composed of one row of large, quadrate, clear areolae; subcostal area biseriate, the areolae much smaller and rounded; discoidal area large, extending a little beyond middle of elytra, with outer boundary vein a little bowed, widest at middle, there seven areolae deep; sutural area large, the areolae a little larger in apical part. Wings fumose, not quite as long as elytra.

Length, 3.50 mm.; width, 1.30 mm.

Type (male) and *allotype* (female), Pondoland, Cape Province, South Africa, R. E. Turner; British Museum. *Paratypes:* 4 specimens, same data as type.

This elongate, brownish species is probably most closely related to *C. pallens* Horvath. The latter is a little longer, pale testaceous, and has a smaller hood and narrower costal area composed of two rows of very small areolae.

Cysteochila chiniana, n. sp.

Yellowish brown with pronotum and median part of elytra more brown, usually a narrow premedian and narrow subapical bands in costal area infuscate; areolae of pronotum and of discoidal and sutural areas of elytra more or less coated with a whitish waxy secretation. Antennae fuscous with first two and last segments dark fuscous clothed with very short, decumbent, golden pubescence, measurements—I, 10; II, 10; III, 95; IV, 35. Bucculae broad, areolate, brownish, contiguous in front. Rostral channel deep, with laminae testaceous, foliaceous, compound of one row of tall areolae; rostrum yellowish brown extending to the middle of metasternum. Legs brown with second tarsal segment infuscate, clothed with short, decumbent, golden pubescence. Orifice with a large

testaceous channel. Abdomen beneath brown with some fuscous, clothed with extremely short, golden pubescence; thorax on sides and beneath blackish.

Pronotum and elytra clothed with very fine, rather long, upright, pale brown hairs, which appear more numerous on outer part of reflexed paranota. Hood small, tectiform, not produced in front. Median carina very high, highest on disc, much higher than lateral, the areolae large, rectangular about twice as high as long; lateral carinae visible only on hind pronotal process, moderately convergent anteriorly; paranota long, broad, reflexed with dorsal surface resting on pronotum and outer margin touching median carina, concealing all of pronotal surface excepting hood, median carina and hind triangular part. Elytra rather broad; costal area wide, biseriate, the areolae large, clear (save in bands); subcostal area narrow, biseriate; discoidal area about two-thirds as long as elytra, narrowed at both ends, widest at middle, there five areolae deep; sutural area more or less fuscous, with a clear subapical spot. Hypocostal laminae testaceous, uniseriate.

Length, 3.40 mm.; width, 1.35 mm.

Type (male), Trinidad, northern Luzon, Philippine Islands, May 22, 1914, and *allotype* (female), Mt. Pollis, elevation 2,400 feet, Feb., 1947; British Museum. *Paratypes:* 4 specimens, Baibalasan, and with types, Luzon, all by G. Bottcher. Named in honor of Dr. W. E. China of the British Museum, whose outstanding publications and most generous cooperation has done so much for the furtherance of Hemipterous studies throughout the entire world.

This species may be distinguished from its congerers from the Philippines and nearby regions by the high median carina, wide costal area, large paranota and hairy vestiture of paranota and elytra.

Cysteochila otaviana, n. sp.

Small, oblong, pale testaceous with disc of pronotum, a broad transverse band (veinlets only) near middle of elytra and some veinlets in sutural area dark fuscous. Head black, with five long, moderately stout, testaceous spines. Rostrum testaceous, darker at tip, scarcely reaching to metasternum; laminae broad, testaceous, composed of one row of high areolae, open behind. Bucculae long, broad, areolate, fuscous with inferior and hind margins testaceous. Orifice with pale channel. Antennae testaceous, with last segment subclavate and brownish, measurements—I, 8; II, 6; III, 50; IV, 18. Hypocostal laminae testaceous, narrow, uniseriate. Venter reddish brown, the underside of thorax blackish. Legs reddish fuscous with tibae and base of tarsi testaceous.

Pronotum a little convex, deeply finely pitted, tricarinate; median carina low on disc, higher in front and behind and there areolate; lateral carinae terminating anteriorly just under the edge of reflexed paranota, parallel and as high as median on hind pronotal process; paranota completely reflexed, resting on surface of pronotum, with front margin rather strongly roundly narrowed, more slowly roundly narrowed behind, the outer margin not touching median carina, much shorter than basal length, jointly rounded with front and hind margins, covering most of the swollen surface between humeral angles; collar raised, rather long, testaceous in front. Elytra very little longer than abdomen; costal area narrow, composed of one row of small areolae; subcostal area wider,

biseriate; discoidal area large, extending beyond middle of elytra, widest at middle, there six areolae deep, narrowed at both ends; sutural area with areolae larger in apical part.

Length, 2.52 mm.; width, 0.88 mm.

Type (male) and *allotype* (female), Otavi, Southwest Africa, June 20, 1920; Drake Collection. *Paratypes:* 4 specimens, same data as type.

The completely reflexed paranota with the rather narrowly rounded outer margin (front margin more strongly roundly narrowed) separates this species from its allies. The paranota covers most of the convex surface between humeral angles.

Cysteochila rhodesiae, n. sp.

Small, ovate, yellowish brown with pronotal disc and sutural and discoidal areas more brownish. Dorsal surface very sparsely clothed with fine, pale, inconspicuous hairs; sides of paranota also with a few pale setose hairs. Head brown, with fine, slender, testaceous spines. Rostrum testaceous with tip black, reaching to base of mesoternum; laminae widely separated, uniseriate, the areolae large. Osteolar canal long and shallow. Antennae pale testaceous, shortly pilose, with fourth segment a little clavate and brownish, measurements—I, 10; II, 8; III, 48; IV, 18. Legs pale testaceous. Body beneath testaceous, the sterna darker. Hypocostal laminae with one row of small areolae.

Pronotum moderately convex, mostly concealed by the large, reflexed paranota; tricarinate, median carina about equally elevated for its entire length; lateral carinae visible and parallel on hind process, then slightly convergent anteriorly and present (concealed) just under outer edge of paranota almost to calli; hood small, tectiform; paranota large, reflexed, resting on pronotal surface, the outer edge just concealing lateral carina. Elytra with outer margin slowly rounded; costal area biseriate, the areolae fairly large and clear; subcostal area narrower, biseriate; discoidal area broad, about two thirds as long as elytra, widest opposite apex of pronotal process, there seven or eight areolae deep.

Length, 2.75 mm.; width, 1.35 mm.

Type (male) and *allotype* (female), Southern Rhodesia, Sept., 1936; Hungarian National Museum, Budapest.

Allied to *C. tarda* Drake, but readily distinguished from it by the smaller size, and the very sparse and inconspicuous dorsal clothing of fine hairs, also the fewer spinulae on basal part of paranota.

Cochlochila parvella, n. sp.

Very small, pale testaceous, with the crest of pronotal cysts and some elytral veinlets dark fuscous. Head black, with five testaceous spines, the hind pair longest and appressed. Antennae pale, very slender, testaceous with terminal segment brownish, measurements—I, 5; II, 5; III, 48; IV, 14. Bucculae black-fuscous with exterior margins whitish, closed in front. Rostrum testaceous with dark apex, with tip extending between intermediate coxae; laminae low, dark, widely separated and cordate on metasternum. Hypocostal laminae narrow, uniseriate. Body beneath deep black. Legs testaceous with second tarsal segment black (in the two females, femora with a subapical black band).

Pronotum concealed from above by the large, inflated, bullate paranota, which leave only front part of collar and apical two-thirds of hind

process of pronotum exposed; collar raised, areolate, whitish; hind triangular process areolate, with the three carinae visible, the lateral pair slightly convergent anteriorly. Elytra with a fairly large tumid elevation (formed by boundary separating discoidal and subcostal being elevated apically; costal area composed of one row of fairly large clear areolae, the outer vein whitish and the transverse veinlets very thick and brown; subcostal area biseriate, then uniseriate beyond cysts; discoidal area not quite reaching middle of elytra, broadly subrounded at apex, there wider and three areolae deep; sutural area with larger areolae, veinlets mostly fuscous; tumid elevation arched at apex of discoidal area.

Length, 2.00 mm.; width, 0.80-0.92 mm.

Type (male), Weenen, Natal, South Africa, Nov., 1928, and *allotype* (female), Port St. John, Pondoland; British Museum. *Paratype:* 1 specimen (female) with one elytra missing), Somerset, Cape Province, Aug. 1923, all by R. E. Turner.

Most closely allied to the species described below, but easily separated from it by the color of legs, dorsal surface of body and pale basal segments of antennae. These are the two smallest species described in the genus *Cochlochila.*

Cochlochila natalana, n. sp.

Head with five short testaceous or brown spines. Antennae very slender, smooth, testaceous with the first two and last segment black-fuscous, measurements—I, 7; II, 6; III, 70; IV, 24. Legs slender, smooth, with femora and tarsi deep black and shining, the tibiae testaceous, coxae and trochanters brown or black. Bucculae black, closed in front, areolate. Rostrum dark brown, not quite reaching base of mesosternum; black, widely separate and cordate on metasternum. Body beneath black. Hypocostal laminae black, uniseriate.

Veinlets of lacy areas largely black-fuscous, some veinlets and areolae in sutural area fuscous. Paranota reflexed, inflated, with the outer margins resting in contact with the median carina, with tumid crest (one on each side) considerably above the pronotal surface. Collar raised, areolate, black with the front margin pale. Hind pronotal process areolate, tricarinate, the lateral carinae slightly convergent anteriorly. Pronotum (paranota removed) moderately convex, pitted, tricarinate, each carinae composed of one row of fairly large cells; lateral carinae slightly convex within on disc. Elytra with venation, areolae and tumid elevation very similar in structures to *C. parvella,* but the veinlets black-fuscous in color.

Length, 2.10 mm.; width, 1.00 mm.

Type (male) and *allotype* (female), Port Shepstone, Natal, South Africa; British Museum. *Paratypes:* 10 specimens, Malvern, St. John (Pondoland) and same locality as type.

Separated from the preceding by the black venation and black first two segments of antennae. The crest of inflated paranota is also a little higher and the antennae are longer.

Perissonemia pagnana, n. sp.

Head black, with five brownish spines. Antennae very long, very slender, indistinctly pubescent, with longer hairs on terminal segment, dark fuscous with segments I, II and III darker, measurements—I, 22; II, 10;

III, 130, IV, 50. Orifice present. Body beneath dark brown to fuscous black. Legs testaceous with tarsi dark. Rostrum yellowish brown, not quite attaining middle of mesosternum. Bucculae closed in front. Genital segment of female with a lateral finger-like projection on each side.

Pronotum reddish fuscous, moderately convex, coarsely punctate, tricarinate, each carina with areolae not very distinct; lateral carinae strongly divergent anteriorly, slightly convex within on disc; paranota pale testaceous, very narow, uniseriate, the areolae small; collar testaceous, areolate. Elytra reddish brown with costal area testaceous, costal area rather wide, uniseriate, the areolae fairly large, clear, largely quadrate in shape; subcostal area biseriate; discoidal area extending a little beyond middle of elytra, widest at middle, there five cells deep; sutural area with fairly large clear areolae, the veinlets largely blackish.

Length, 3.50 mm.; width, 1.12 mm.

Type (female) Kampala, Uganda, Africa, Jan. 21, 1935; in Drake Collection. *Paratypes:* 5 females, same locality as type.

Allied to *P. sierrana,* n. sp. in general appearance, but larger with much longer antennae, wider paranota, and with large cephalic spines.

Perissonemia sierrana, n. sp.

Head black, unarmed; eyes large, black. Antennae rather long, entirely black-fuscous, indistinctly pubescent, with longer hairs on fourth segment, measurements—I, 16; II, 10; III, 84; IV, 31. Legs testaceous with apical segment of tarsi infuscate. Orifice distinct, with rim of canal testaceous. Rostrum yellowish brown with tip infuscate; the apex reaching to middle of mesosternum; laminae low, widely separated, with ends meeting behind. Hypocostal ridge uniseriate. Body beneath black-fuscous, pretty much coated with bluish white exudation.

Dorsal surface dark fuscous, slightly shining, lightly coated with a bluish white secretion (costal area without waxy exudation), the waxy exudation on calli and head in thick layers or little piles. Pronotum not very convex, coarsely pitted, sharply tricarinate, carinae without distinct areolae (median with small areolae on calli); lateral carinae feebly lower, strongly divergent anteriorly, slightly concave within on anterior part of disc; paranota very narrow, carina-like, wider and testaceous opposite calli, there with one large areola; collar raised, prominent, margined, with testaceous in front. Elytra faintly constricted behind middle; costal area rather wide, testaceous, uniseriate, the areolae fairly large and clear; subcostal area wider, biseriate; discoidal area about two-thirds as long as elytra, narrowed at both ends, widest at middle, there six areolae deep; sutural area with two or three rows of small cells behind discoidal, then with larger areolae.

Length, 2.60 mm.; width, 0.80 mm.

Type (male), Njala, Sierra Leona, West Africa, Nov. 9, 1928, on Bomamagbai, E. Hargreaves; British Museum. *Paratypes:* 1 female, same data as type.

Separated from *P. pagana,* n. sp., below by slightly thicker and shorter antennae, unarmed head and shorter body.

Perissonemia delagoana, n. sp.

Small, oblong, dark reddish fuscous with front margin of collar, upper margin of carinae, apex of hind process of pronotum and costal area

pale testaceous, slightly shining. Head tumid above, black-fuscous, shining, with five testaceous spines; hind pair long, appressed, the other three much shorter. Antennae very slender, extremely long, very shortly pubescent, pale testaceous with fourth (save base) dark fuscous, measurements —I, 18; II, 9; III, 100, IV, 45. Rostrum testaceous with tip blackish, not attaining base of mesoternum; laminae low, dark fuscous, divergent posteriorly, with ends meeting behind. Legs pale testaceous with tips of tarsi brownish. Orifice distinct. Hypocostal laminae dark fuscous with apical part pale, very wide, almost entirely biseriate; body beneath dark reddish fuscous.

Pronotum moderately convex, punctate, tricarinate; carinae raised, rather thin, each composed of one row of tiny areolae, the median a little more elevated on calli; lateral carinae slightly divergent anteriorly, distinctly convex within on disc; paranota represented by a very low carina, wider and with one cell opposite calli, the cell bounded by a rather thick, rounded, testaceous vein. Elytra moderately constricted beyond middle, longer than abdomen; costal area narrow, obliquely reflexed in basal half, slightly wider in apical fourth, uniseriate, the areolae clear and small; subcostal area much wider, biseriate; discoidal area extending a little beyond middle of elytra, narrowed at both ends, widest near middle, there four areolae deep, the inner row of areolae and marginal vein beyond the middle testaceous; sutural area with larger areolae, the apex and a few areolae on each side in front of apical dark band testaceous and clear, areolae dark fuscous areas also infuscate.

Length, 2.75 mm.; width, 0.85 mm.

Type (male) and *allotype* (female), Dalagoa Bay, Mozambique, Africa, Feb. 8, 1935; British Museum. *Paratypes:* 3 specimens, same locality as type.

This very pretty species may be distinguished from its African congeners by color, pale antennae and biseriate hypocostal laminae.

Furchilliger cheesmanae, n. sp.

Long, slender, brown with anterior part of bucculae and most of fourth antennal segment blackish. Head with five rather long, stout spines; median and anterior spines upright, the hind pair longer, decumbent. Bucculae long, broad, areolate, contiguous in front. Antennae indistinctly pubescent, measurements—I, 17; II, 16; III, 95; IV, 35. Eyes large, black-fuscous. Legs brownish. Hypocostal laminae uniseriate, the areolae moderately large, quadrate. Rostrum long, testaceous, reaching almost to end of sulcus.

Pronotum rather short; collar wide, not produced anteriorly at middle, with a small inflated elevation just behind collar which bears two, prong-like, upright projections; median carina composed of one row of areolae; lateral carinae visible on hind projection up to reflexed paranota, distinct, without cells, convergent anteriorly; hind projection triangular, areolate. Paranota rather short, extremely wide, reflexed and greatly modified, with the basal part turned obliquely upward (one row of very wide cells), then reflexed (one row of wide and two or three rows of small cells) to pronotal surface (two surfaces between wide cells not quite in contact), then sharply turned up so as to form a high, nearly semicircular, carina-like elevation, with the apical part abruptly turned down so that the outer margin rests on the pronotal surface near

the median carina (the two sides of the carina-like elevation are not quite in contact with each other). Elytra long, with outer margins subparallel and finely serrate, considerably longer than abdomen; costal area uniseriate, the areolae fairly large, clear, subquadrate; subcostal area narrower, biseriate; discoidal area extending a little beyond the middle of elytra, narrowed at both ends, with boundary veins slightly raised and the outer a little sinuate, widest near middle, there seven or eight cells deep; sutural area large, the cells larger in apical half.

Length, 3.54 mm.; width, 1.00 mm.

Type (male), Kokoda, Papua, elevation, 1,200 feet, Aug., 1933, L. E. Cheesman; British Museum; named in honor of Miss Cheesman.

This is the second species described in the genus *Furchilliger* Horvath. *F. comptus* Drake (Jr. Wash. Acad. Sci., 32 (12): 363, 1942, belongs to the genus *Lasiacantha* Stal, and is here transferred to that genus (New combination). *F. cheesmanae* n. sp. is much more elongate and darker in color than *F. asperulus* Horvath of Australia. The paranota are also quite different and more strikingly modified.

Lasiacantha gambiana, n. sp.

Small, brownish with the dense vestiture of thick hairs and thick setose hairs on body and appendages whitish. Head reddish brown, with five testaceous spines; hind pair of spines appressed, the median and frontal pair porrect; antennae short, rather stout, densely clothed with very long, thick, stiff, whitish, setose hairs, measurements—I, 14; II, 14; III, 32; IV, 20. Rostrum testaceous, extending beyond middle of mesosternum. Orifice with prominent rim. Hypocostal laminae with one row of moderately large cells. Legs fuscous with tibiae pale testaceous. Bucculae, rostral laminae legs and body beneath with the modified thick, recumbent, whitish hairs.

Pronotum very little convex, tricarinate, each carina composed of one row of fairly large areolae, the dorsal marginal vein mostly fuscous; lateral carinae parallel; hood moderately large, with basal part somewhat flattened and the upper part narrower and slightly compressed laterally; paranota rather narrow, reflexed, with outer marginal row of cells turned upright. Elytra widest at middle, then strongly roundly narrowed posteriorly to apical sixth, with apical part narrow and the apex rounded; costal area moderately wide, uniseriate, with areolae moderately large and clear, the outer margin beset with short blunt teeth and spinulae; subcostal area much wider, mostly triseriate; discoidal area five-sixths as long as elytra, with outer boundary vein a little raised and toothed on median part, narrowed at both ends, widest at middle there five cells deep; sutural area very long, very narrow, only four or five areolae deep in widest part. Entire dorsal surface densely clothed with the thick and modified whitish hairs.

Length, 3.00 mm.; width, 1.25 mm.

Type (male), Bathurst, Gambia, West Africa; Drake Collection.

Allied to *L. sideris* Drake, but much smaller, with narrower paranota, slenderer hood, and much more densely clothed with modified hairy vestiture, especially antennae.

Habrochila clivosa, n. sp.

Head dark fuscous, with three moderately long dark spines, the hind pair wanting. Bucculae narrow, with anterior ends widely separated.

Orifice indistinct. Rostrum brownish with black tip, reaching between hind coxae. Hypocostal laminae very short, foliaceous. Antennae clothed with rather long fine hairs; segments I and II brown; III testaceous; IV black; measurements—I, 30; II, 8; III, 78; IV, 30. Veinlets fuscous or black-fuscous; areolae hyaline, brown or dark fuscous in inflated tumid elevations. Entire body slightly shining. Hood, inflated posterior part of pronotum, tumid elevations of elytra, outer margins of paranota and elytra beset with very pale setae or hairs; veinlets with a few scattered shorter hairs.

Pronotum dark fuscous, feebly convex, without lateral carinae; median carina very short, low, connecting hood and hind tumid process of pronotum; hood large, strongly inflated, with sides rounded, scarcely longer than high, extending anteriorly as far as apex of head; hind pronotal process strongly inflated, as high as hood, front part wider with anterior surface flat, hind part strongly impressed on each side; paranota quite wide, moderately reflexed, composed of four very wide cells, with two small cells at outer end of anterior cell. Elytra with large tumid elevations reaching slightly beyond middle in macropterous form, about three-fourths as long as elytra in brachypterous form; costal area uniseriate. Legs yellowish brown, clothed with short pale hairs.

Length, 3.25 mm. (macropterous), 2.70 (brachypterous); width, 1.75 mm.

Type (brachypterous male) and *allotype* (brachypterous female), Port Shepstone, Natal, South Africa, 1897, R. F. Turner; British Museum. *Paratypes:* 4 specimens (1 macropterous), same locality as type.

This species and *H. africana* Drake are without lateral carinae. *Africana* has five cephalic spines, much smaller and lower hood and less inflated posterior pronotal process; it is also a little larger and slightly paler in color.

Habrochila laeta, n. sp.

Small, veinlets fuscous or brown, mostly dark fuscous, shining, the areolae hyaline. Antennae testaceous, with basal three-fourths of first segment infuscate, the last black, measurements—I, 25; II, 7; III, 85; IV, 27. Legs testaceous with femora and last tarsal segment infuscate. Rostrum brown with blackish tip, with apex extending between hind coxae. Orifice indistinct. Hypocostal laminae short, with two long cells at the base. Margins of elytra and paranota finely serrate, with scattered long hairs (some apparently rubbed off in type series); veinlets also with some erect hairs. Bucculae short, open in front.

Head dark fuscous, with five short, rather stout, porrect, blackish spines. Pronotum dark fuscous, shining; hood and inflated hind process of pronotum much smaller and much darker than in *H. darthula* (Kirkaldy); lateral carinae composed of one cell as in *darthula*, but slightly larger and with the apical part arched and free (attached on entire hind margin to inflated hind process in *darthula*). Elytra smaller and with darker veinlets than in *darthula*.

Length, 2.55 mm.; width, 1.25 mm.

Type (male) and *allotype* (female), both carded on the same rectangular card, Bengalore, Madras South India, T. V. Campbell; British Museum. *Paratypes:* 4 specimens, same data as type.

In addition to the comparative structures mentioned above, *laeta*, n. sp.

differs from *darthula* by having shorter and slightly stouter antennae (*darthula:* I, 31; II, 12; III, 90; IV, 30), more incrassated fourth antennal segment and darker femora.

Agaotingis, n. gen.

Moderately large, broad, distinctly lacy. Head short, with five spines. Antennae moderately long, slender; segments I and II short, a little swollen; III longest, slender; IV rather long, slightly enlarged, approximately half as long as III. Rostrum reaching to metasternum. Orifice distinct. Bucculae broad, contigous in front. Pronotum moderately convex, uniseriate, with posterior process triangular and areolate; hood small, inflated, concealing most of head. Paranota moderately large, subglobose, reflexed upright with margins meeting in front, then angulately opened posteriorly and exposing median part of pronotum. Elytra quite broad, distinctly wider and much longer than abdomen, abruptly widened near base, with apices separated, divided into the usual areas, without tumid elevation, practically flat, the discoidal, subcostal and sutural areas on the same level as costal; areolae moderately large, rather small in discoidal and sutural areas. Hypocostal laminae uniseriate.

Type of genus, *Tingis australis* Montrouzier.

The hood, paranota and pronotum ally this genus with *Cochlochila* Stal, but the elytra are quite sharply widened near the base, without tumid areas and the dorsal surface is nearly level.

Agaotingis australis (Montrouzier).

Tingis australis Montrouzier, Ann. Soc. Linn. (2). 11: 235. 1864.
Tingis australis Lethierry and Severin, Cat. Gen Hemip., 3: 26. 1896.

Since the publication of the original description of *Tingis australis* Montrouzier, the species has been almost entirely overlooked in the literature and its identity unknown. Lethierry and Severin (loc., p. 26) listed it under the caption "Species Tingidarum fam. incerti generis." While studying the types of African Tingidae in the Musei Royal du Congo Belge, Tervuren, Belgium, during the past August (1953), Dr. H. Schouteden very generously presented me the type of *australis* from the Montrouzier Collection, which he had purchased a number of years ago. Insofar as known, this represents the only pinned specimen.

Genus *Serenthia Spinola.* 1837
Agramma Westwood, 1840.
Wombalia Schouteden, 1919.
Type, *Serenthia atripacolla* Spinola, 1837

An examination of the type of the genus *Wombalia* Schouteden (Rev. Zool. Afric., Bruxelles, 6:139) shows that *W. vanderysti* Schouteden belongs to and is a valid species of genus *Serenthia* Spinola (= *Serenthia vanderysti* (Schout.), and thus it is necessary to place the generic name *Wombalia* in synonymy (new combination and new synonymy). *Serenthia* is a large genus and widely distributed in the Eastern Hemisphere, and is not known to occur in the Americas.

Serenthia longa, n. sp.

Very long, slender, testaceous; head and pronotum (save margin of collar and posterior pronotal process) black. Antennae long, brown with

basal segment black; segment I thick and subequal in length to II; III tapering apically; IV scarcely enlarged; measurements—I, 12; II, 12; III, 37; IV, 18. Head without spines; eyes reddish fuscous. Legs short, brownish testaceous. Bucculae long, rather narrow, testaceous, closed in front. Orifice present. Rostrum reaching middle of mesosternum. Hypocostal laminae uniseriate, the areolae tiny.

Pronotum feebly convex, almost flat, closely punctate, with median carinae very little raised. Elytra convex, with veins separating subcostal, discoidal and sutural areas feebly indicated or absent; coastal area very narrow, composed of one row of tiny areolae.

Length, 2.60 mm.; width, 68 mm.

Type (male) and *allotype* (female), Ceres, Cape Province, Africa, elevation, 1,500 feet, Jan. 1921, R. H. Turner; British Museum. *Paratypes:* 2 specimens, same locality as type; 7 specimens, Swellendam, Cape Province.

This species is distinctly longer and slenderer than other African species of *Serenthia;* the tapering third antennal segment and very narrow costal area are also differentiating characteristics.

Serenthia singula, n. sp.

Head deep black, shining, roundly convex, with two very short, brownish frontal spines. Antennae yellowish brown, very shortly pilose, measurements—I, 12; II, 8; III, 36; IV, 15. Rostrum brownish with darkened apex; reaching a little beyond prosternum. Bucculae broad, closed in front, black-fuscous with inferior margin and hind part pale testaceous. Orifice distinct. Hypocostal laminae narrow, uniseriate. Legs brownish. Body beneath dark fuscous with sterna and pleura darker.

Pronotum moderately convex, closely coarsely punctate, with distinct median carina, fuscous-brown with sides generally darker; collar white; hind process areolate and testaceous. Elytra pale testaceous; costal area rather narrow, uniseriate in front, wider and biseriate in apical third; subcostal area wide, largely four areolae deep; discoidal area wide, open behind and not separated from sutural, the long vein separating subcostal from discoidal and sutural areas distinct, practically straight. Wings a little longer than abdomen.

Length, 2.25 mm.; width, 0.95 mm.

Type (male) and *allotype* (female), Somerset East, Cape Province, Africa, Nov., 1941; British Museum. *Paratypes:* 7 specimens same locality as type and 2 from Katberg, all collected by R. E. Turner.

Distinguished from other members of the genus by the biseriate apical third of the costal area of the elytra.

Serenthia aliwalana, n. sp.

Head black, unarmed; eyes reddish fuscous. Antennae brownish or reddish brown with first segment and apical two-thirds of last dark fuscous, measurements—I, 12; II, 10; III, 40; IV, 18. Legs dark fuscous with narrow tips of femora, tibiae and tarsi brownish. Pronotum moderately convex, closely punctate, the median carina disappearing before reaching apex of hind pronotal projection, black with front margin of collar and apical process of pronotum testaceous. Elytra testaceous with boundary vein of discoidal area indicated by slightly darker color; costal area extremely narrow, composed of one row of fairly distinct,

very tiny areolae; subcostal area wide, mostly four areolae deep; discoidal area wide, about three-fourths as long as elytra, widest in front of middle, there six cells deep. Wings a little shorter than elytra.

Length, 2.35 mm.; width, 0.56 mm.

Type (male) and *allotype* (female), North Aliwal, Cape Province, Africa, elevation, 4,350 feet, R. E. Turner; British Museum. *Paratypes:* 4 specimens, same data as type.

Separated from other African species by the color of pronotum, antennae and legs, and the extremely narrow costal area of elytra.

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BRASILIAN THYSANOPTERA. IV.[1]

By J. Douglas Hood

In conformity with current practice and with the earlier papers in this series, the writer has employed the masculine gender for the Greek word *thrips*. Beginning with Hinds, in 1902, all students of the group, throughout the world, with only one exception to the best of my knowledge, have invariably treated the word as masculine, for the adequate reason that it is so given in the lexicons. The Latin word *thrips*, taken over from Greek, is similarly given as masculine in the Latin dictionaries. Both the zoological and botanical codes of nomenclature are thoroughly specific in stating that a Greek or Latin word adopted as a generic name retains its classical gender; and generic names formed by two or more Greek or Latin words of course take the gender of the last word. This means that the genus *Thrips* and all other genera ending in that word are indisputably masculine and are to be treated as masculine.

[1] The preceding paper in this series was published in these Proceedings, vol. 65: 141-176, 1952.

Yet, in an earlier paper in these same Proceedings (Vol. 65, p. 129), an attempt was made to establish *Thrips* and its compounds as feminine, on the basis of two facts: (1) it has been so employed for nearly 150 years, in comparison with only 51 years of usage as a masculine noun, and (2) Linné considered it to be feminine. Under the Code, as was pointed out above, these facts are clearly irrelevant and immaterial. However, it is always possible to appeal to the International Commission on Zoological Nomenclature to reverse its position or to make a special exception; and it might be urged in such an appeal that, in view of the long usage of *Thrips* and several of its compounds in the feminine gender, one of the avowed major objectives of the Code, namely that of insuring the stability of names, would better be served by treating it as feminine. We can say with all confidence that past decisions by the Commission on other matters of a somewhat similar nature indicate that they would deem stability and universality of nomenclature their two prime objectives, and would rule that the extent of usage during the two periods of time is more important than the lengths of the periods themselves. The Commission almost certainly would hold that the very limited use of the feminine gender in the description of a mere 125 species or so, in a literature that is almost wholly out of date, and which was diluted over a formative period of 150 years, does not even remotely approximate the extent of usage during the last 51 years, in which period perhaps 3000

species were described as new and virtually all of the old ones redescribed and figured, consistently in the masculine gender, in a comprehensive and much-used literature embracing many thousands of pages. It would be most unfortunate were two schools to develop, one using the word as feminine in spite of the strict provision of the Code, the other using it as masculine, as has been the practice.

In connection with the second irrelevant fact mentioned above—namely, that Linné should be followed because he, the author who proposed the genus *Thrips*, treated it as feminine—it may prove interesting to note that, though such well-known Linnaean genera of plants as *Orchis*, *Stachys*, *Strychnos*, and *Andropogon* are all classically masculine, Linné treated the first three as feminine and the last as neuter. The botanical code, unlike the zoological one, places weight upon historic usage, and, in weighing the advantage of stability against classical usage, has sometimes determined in favor of the former. Thus, it follows Linné in using the feminine for the first three of these genera, but *Andropogon* is given its classical gender.

As a final comment on this subject of the gender of *thrips*, it is noted that the author who insists that the word should be considered feminine and who proposes that it be used as such, though he mentions only two species in his paper, calls one of them *caenosa* and the other *pulcher!*

A few further words, on methods, must be introduced here to make clear what follows in the rest of the paper. In these descriptions, as well as in all others published by the writer during perhaps the last thirty years, measurements and statements are based upon specimens which have not been flattened in the mounting process, and which, by *test*, have been shown to be floating *free* in the Canada balsam. When measurements and proportions are used in descriptive work, crushed specimens are often worse than worthless, because misleading.

Many published measurements of structures which are inclined upward or downward have clearly been secured by getting the horizontal distance between the two ends. This overlooks the fact that the side of a right-angled triangle is shorter than its hypotenuse. Unless the specimen is greatly flattened, the resulting discrepancy is often great. The correct dimension, in most cases, must obviously be secured by computation. The work of several authors has been found misleading in this respect, through a study of their unique types.

To save space below, all illustrations have been omitted and the following abbreviations used for the most frequently mentioned setae; po., postoculars; ioc., interocellars; poc., postocellars; occ. occipitals; am., antero-marginals; aa., antero-angulars; ml., midlaterals; ep., epimerals; pm., postero-marginals; cx., coxals. Measurements are in microns and of the holotype or allotype, unless otherwise stated.

Finally, deep obligations must be acknowledged to Dr. H. Priesner, who has a greater knowledge of the phyllophilous Thysanoptera than any other worker, for examining very critically the last three genera described below; and to Mr. Fritz Plaumann, of the state of Santa Catarina, Brazil, for a wealth of carefully collected material.

Plesiothrips longicollis, sp. nov.

Like *andropogoni* in having pronotum much longer than head, but differing from that species in the brown, instead of yellow body.

♀ (macropterous): Color brown, darker in head and last four abdominal segments; legs yellow, not shaded; fore wings pale yellowish, antennae with segments I and II concolorous with head, III yellow but lightly shaded with brown beyond middle, IV brown but paler beyond setae and yellow in basal fifth, V yellowish in basal fifth, remainder of antennae concolorous with head. Length about 1.3 mm. (distended, 1.6). Head 130, cross-striate as usual, broadest across eyes (117), slightly narrowed behind eyes (106), then very slightly widened (107), narrowed again at basal third of cheeks (103), and slightly widened again basally (106); head-process very short (6-7), broadest (58) at antennae, narrowest (56) near base, its sides concave; eyes 67, width 39, interval 40, much longer than their distance from base of head; median ocellus 7 behind front margin of eyes, posterior ocelli 11 in diameter and 21 apart; ioc. 27, 17 apart; two pairs of minute setae in advance of median ocellus; occ. close to inner posterior angles of eyes and 50 apart; mouth-cone long (127). Prothorax long (157) and narrow (137), striate across anterior and posterior margins, smooth elsewhere, outer seta at posterior angles 45, inner 52; mesothorax 167 across anterior angles, 185 posteriorly; metathorax 174 posteriorly; fore wings 756. Abdomen 216 at segment V, without tympana on sternum III; seta I on IX 118, II 145, III 142; seta I on X 142, II 127. Antennal segments: I 26(29), II 34(26), III 42(24), IV 50(23), V 35(17), VI 55(19), VII 10(9), VIII 14(7), or VII and VIII united and 26μ long; sense-cones and chaetotaxy normal.

BRAZIL: Nova Teutonia, S.C., May 24, 1949, Fritz Plaumann, 1 ♀ (holotype), from grasses.

Damerothrips, gen. nov.

(*δ*, intensive prefix; *Merothrips*, an allied genus)

Allied to *Erotidothrips* Priesner,[2] the only other living genus of Merothripidae with 9-segmented antennae, but with very long postocular and midlateral prothoracic setae, 4 pairs of short setae on anterior margin of prothorax, and 3 short pairs on posterior margin; antennal segments V-VIII rounded (rather than constricted) at apex and thus not vasiform, their setae and single sense-cones approximately two or three times as long as the supporting segment, sense-cones on V-VII ventro-lateral, that on VIII dorsal and longest; sensory areas on III and IV large, longer than half the segment and nearly encircling it; mouth-cone broadly rounded, maxillary palpi 3-segmented.

Type species: *Damerothrips gemmatus*, sp. nov.

[2] Hereby transferred from the Superfamily Aeolothripoidea to the Family Merothripidae.

Damerothrips gemmatus, sp. nov.

♀ (macropterous): Brown, abdomen paler, internal pigmentation red; femora brown, fore pair darkest, tibiae yellowish apically, tarsi yellow; fore-wings brown, slightly paler between veins; antennae brown, bases of V-IX yellowish, sensory areas on III and IV bright red and conspicuous. Length about 1.1 mm. (distended, 1.4 mm.); head 158 long, 138 across eyes, 129 behind eyes, 136 across cheeks, 118 at base, with deep U-shaped frontal costa; po. 68, 86 apart, 7 from eyes; ioc. 36; other setae short, one pair in front of median ocellus, one in front of lateral

margins of posterior ocelli, two margining eyes, four on or near cheeks. Pronotum 118 long, with strong apodeme across anterior sixth and a very fine median one, finely striate posteriorly; ml. 100, other setae short; trans-coxal width 193; fore tibiae with sharp tooth at tip of inner surface. Mesothorax 216 wide, metathorax (posteriorly) 199; fore wings 584. Abdomen (at segment IV) 255, setae on X ca. 173. Antennal segments: I 31(33), II 37(31), III 49(30), IV 49(27), V 29(19), VI 33(20), VII 35(18), VIII 30(16), IX 28(12); longest setae on III-IX 53, 56, 44, 72, 67, 77, and 80, sense-cones on V-VIII 67, 97, 92, 103, respectively.

BRAZIL: Rondon, Paraná (Lat. 54°S., long. 24°30'W.), September, 1952, Fritz Plaumann, 2 ♀ ♀ (including holotype).

Merothrips tympanis, sp. nov.

Structure much as in type species and its close allies, but with the sensory areas on antennal segments III and IV extending across outer half or more of ventral surface of segments and with the eyes margined posteriorly and medially by two pairs of setae between postoculars and postocellars, the outer and more posterior of these being the occipitals.

♀ (macropterous): Color light grayish brown, head and antennae (except the yellow segment II) dark brown. Length about 0.89 mm. (distended, 1.2). Head 90, width across eyes 80, behind eyes 75, across cheeks 76, near base 70; eyes 48, width 25, interval 30; po. 25, interval 65, 5 from eyes; ioc. 58; mouth-cone 40, maxillary palpi 3-segmented. Prothorax 126, across coxae 145, single seta at posterior angles 60; mesothorax 145, metathorax (posteriorly) 136; fore wings 537; mesonotal seta 37. Abdomen (at segment VII) 153; seta I on IX, II 107, III 121. Antennal segments: I 20(25), II 29(24), III 37(22), IV 34(20), V 25(15), VI 26(14), VII 25(13), VIII 37(11).

BRAZIL: Nova Teutonia, S. C., Dec., 1951, 11 ♀ ♀ (including holotype); Rondon, Paraná, Sep., 1952, 5 ♀ ♀. All taken by Fritz Plaumann from dead branches.

Merothrips brevisetis, sp. nov.

Structure much as in type species and its close allies; sensory areas on antennal segments III and IV confined wholly to dorsal and outer surfaces of segments; eyes margined posteriorly and medially by one pair of setae (the occipitals) between postoculars and postocellars; segment III of antennae less than twice as long as wide; setae short, the postoculars about 13 μ, mesonotals 15.

♀, macropterous form: Color light grayish brown, head and antennae (except yellow segment II) dark brown. Length about 0.75 mm. (distended, 0.84). Head 80, width across eyes 77, behind eyes 70, across cheeks 71, near base 66; eyes 42, width 24, interval 30; po. 13, interval 52, 2 from eyes; ioc. 43; mouth-cone 47, maxillary palpi 3-segmented. Prothorax 104, across coxae 144, single seta at posterior angles 39; mesothorax 160, metathorax (posteriorly) 136; fore wings 608. Abdomen (at segment IV) 207; seta I on IX 20, II 105, III 129. Antennal segments: I 21(24), II 28(23), III 33(18), IV 31(17), V 24(13), VI 27(14), VII 26(14), VIII 35(11).

♀, apterous form: Like macropterous form, but with smaller eyes

(30 long, 18 wide, 32 apart), cheeks more rounded (width behind eyes 63, across cheeks 69, at base 65); po. 11, setae at posterior angles of pronotum 37, mesonotals 17, setae on IX of abdomen, I 20, II 97, III 108.

♂ (apterous): Head with the granulated area extending from interocellar setae almost to posterior margin of head, excepting for a triangular area at basal angles; anterior margin of pronotum not deeply concave, surface not sculptured in anterior three-fourths; heterogonic maximum form with strong tooth on inner surface of fore femora near base.

BRAZIL: Belém, Pará, July 23 (1♀, macr., holotype), 29 (3 ♀♀, macropterous, and 3♂♂, including allotype), August 2 (1♀, macr., holotype), Aug. 6 (1♂), and Aug. 21 (1♂, large morphotype). The material was taken by the writer from dead branches of *Hevea* and *Bixa*.

Hoplothrips testaceus, sp. nov.

Allied to *semicaecus*, but much larger, heavier, and more strongly sclerotized (especially in tube), the tube much less than twice as long as wide, the antennae slender and concolorous with body, rather than darkened in last five segments.

♀ (brachypterous): Color rich brownish yellow throughout, tube more deeply so except across base and at tip, where it is more yellowish, the legs and antennae concolorous with body. Length about 2.7 mm. (distended, 3.3). Head 294, faintly reticulate at sides basally, remainder smooth, across eyes 269, across cheeks 284, near base 237, length in front of eyes 57; cheeks rounded anteriorly to eyes, subparallel basally, convex between; production between eyes and antennae 17, shallowly concave, 150 wide at antennae; frontal costa broad (40), nearly straight in dorsal aspect; eyes 68, width 57, interval 156, protruding, with enlarged facets at sides posteriorly, about five facets forming lateral outline; po. 121, yellow, curved, finely pointed, 251 apart, about 22 from eyes. Prothorax 272, 557 across coxae, very faintly substriate in anterior angles and along posterior margin; am. minute and slender, others formed and colored like po., aa. 54, ml. 93, ep. 85, pm. 147, cx. 94; mesothorax 465 across anterior angles, metathorax 479 posteriorly. Abdomen 588 at segment IV; tube 224, across basal collar 130, subbasally 125, apex 53, sides straight, wall thickened (16μ); terminal setae 166; setae on IX pointed, I 185, II 100, III 110. Antennal segments: I 64(66), II 76(50), III 86(47), IV 83(46), V 80(44), VI 82(41), VII 70(36), VIII 75(19), the last fusiform; major sense-cones short, on III-VI all 1(1), lateral.

BRAZIL: Nova Teutonia, S. C., May, 1949, Fritz Plaumann, 2 ♀♀ (holotype and paratype), from dead branches.

Hoplothrips lacteus, sp. nov

Allied to *semicaecus*, but much smaller, slenderer, and paler, with the antennae darkened only in segment VII, which is pedicellate.

♀ (brachypterous): Color very pale, creamy white in life, with faint gray cloud across front of head and posterior part of mesonotum and with the anterior angles of mesothorax and sides of second abdominal segment similarly faintly clouded; legs and antennae concolorous with body, except for slightly shaded tip of antennal segment VIII. Length about 2.2 mm. (distended, 2.7). Head 249, extremely faintly reticulate

basally at sides, remainder smooth, across eyes 186, across cheeks 224, near base 182, length in front of eyes 40; cheeks rounded anteriorly to eyes, converging and nearly straight to base; production between eyes and antennae short, concavely converging to antennae, where it is 146 wide; frontal costa narrow (23); eyes very small, 40 long, 30 wide, 127 apart, not at all protruding anteriorly, posterior lateral facets somewhat enlarged, only two or three facets forming lateral outline; po. 107, yellow, slightly curved, with finely drawn-out points, 189 apart and about 36 from eyes. Prothorax 208, 361 across coxae, smooth except for a few faint striae along posterior margin; am. minute and slender, others formed and colored like po., aa. 59, ml. 106, ep. 127, pm. 101, cx. 105; mesothorax 336 across anterior angles, metathorax 346 posteriorly. Abdomen 462 at segment III; tube 171, subbasal width 86, at apex 40, sides straight, wall not thickened; terminal setae 137; setae on IX pointed, finely drawn out at tip, I 207, II 210, III 141. Antennal segments: I 62(52), II 71(38), III 74(43), IV 58(42), V 58(41), VI 56(36), VII 56(30), VIII 63(22), the last pedicellate; major sense-cones short, on III-VI all 1(1), lateral.

♂ (brachypterous): Color and structure essentially as in ♀; seta II on abdominal segment IX shortened, 70.

BRAZIL: Boracéa, Munic. de Salesópolis, S.P., June 5, 1948, J.D.H., 5 ♀♀ (including holotype) and 2 ♂♂ (including allotype), from dead branches in edge of wet jungle.

Hoplothrips orbiculatus, sp. nov.

Closely allied to *orbiceps*, but with stouter tube, longer setae, and sense-cones on both III and IV 1(1).

♀ (macropterous): Color yellowish brown, with head darker; tube concolorous with body in about basal fourth, remainder yellow, paler at tip; legs about concolorous with body, with tarsi and ends of tibiae yellow; fore wings pale yellowish gray, somewhat darkened marginally; antennae dark brown (like head) in segment I, yellow in II and III, brownish yellow in IV-VIII, IV somewhat paler than the others, VIII darker. Length about 1.9 mm. (distended, 2.6). Head 234, with a few faint cross-striae at base, otherwise nearly smooth, across eyes 220, across cheeks 231, only 169 at base, broadest just behind eyes, very slightly concave in front of base, the cheeks with eyes otherwise forming a nearly perfect arc to bases of antennae, length in front of eyes 33; production in front of eyes scarcely 7, its sides straight and about parallel, 111 across; frontal costa narrow (23); eyes not at all protruding, about 79 long, posterior lateral facets not enlarged, about nine in lateral outline; po. 43, brown, pointed, nearly straight, 195 apart and 25 from eyes. Prothorax 213, 350 across coxae, almost perfectly smooth; am. and ml. minute, the former about 10 behind margin, others formed and colored like po., aa. 18, ep. 41, pm. 19, cx. 49; mesothorax 364 across anterior angles, metathorax 377 posteriorly; fore wings without accessory hairs on posterior margin. Abdomen 414 at segment III; tube 126, subbasal width 78, apex 36, sides concave, wall slightly thickened (about 3μ); terminal setae 110; setae on IX finely pointed, I 113, II 93, III 107. Antennal segments: I 53(50), II 62(36), III 63(36), IV 54(35), V 54(35), VI 53(30), VII 54(27), VIII 61(20), the last pedicellate; major sense-cones short, on III-VI all 1(1), lateral.

BRAZIL: Serra da Cantareira, Franco da Rocha, S.P., June 11, 1948, J.H.D., Frederick Lane, and Lauro Travassos F., 1♀ (holotype), from dead branches on ground; Nova Teutonia, S. C., November 20, 1949, Fritz Plaumann, 1♀ (paratype).

Lissothrips dispar, sp. nov.

Very different from congeners in that the head of the macropterous form is about twice as long as the pronotum, the fore wings with about 5 accessory setae, and the intermediate segments of abdomen with two pairs of sigmoid wing-retaining setae.

♀ (macropterous): Color nearly uniform blackish brown, legs and antennae concolorous with body, save for the yellow tarsi, the distinguishably paler knees, and the somewhat paler third antennal segment with its yellow pedicel, the first segment only slightly paler at base; fore wings dark gray brown. Length about 1.3 mm. (distended, 1.6); dorsal surface smooth and shining, virtually without sculpture. Head 167, across eyes 144, across cheeks 150, at base 124, vertex slightly produced, conical, median ocellus not quite attaining front margin of eyes; eyes 50, 44 wide, 51 apart; po. 65, 108 apart, 19 from eyes, pale, straight, dilated and divided at tip. Prothorax 87, across coxae 244, am. setae minute, pointed, others like po., aa. 59, ml. 54, ep. 64, pm. 60, ex. 53; mesothorax 221 across anterior angles, mesonotal seta 37, like po; metathorax 221 across posterior part. Abdomen 260 (at segment V); median tergite of I with a pair of pores; tube 97, near base 66 across, at tip 31, sides straight, terminal setae 120; setae on IX pointed, I 146, II 170, III 137; III-VIII with two pairs of sigmoid wing-retaining setae and with the two upper lateral series pale and knobbed, excepting pointed lower on VII, the inner on III 88. Antennal segments: I 34(30), II 45(29), III 36(23), IV 44(27), V 42(26), VI 45(23), VII 43(21), VIII 36(13); major sense-cones slender, III, V, and VI 1(1), IV 1(2), VII 1 dorsal.

♂ (macropterous): Like female in all essential features of color and structure.

BRAZIL: Belém, Pará, Aug. 4, 1951, J.D.H., 11♀♀, 5♂♂ (all macropterous, including holotype and allotype), from moss on *Hevea* trees.

Lissothrips eburifer, sp. nov.

Macropterous form like that of *muscorum* in absence of accessory wing setae and in having only one pair of sigmoid wing-retaining setae on segments III-VIII of abdomen, the macropterous and brachypterous forms of both species with pores on media tergite of I, major setae on II-IX all pointed, and with a pair of large lateral mesonotal setae; but am. minute and tergum II of abdomen with only one pair of long setae.

♀, forma macroptera: Color blackish brown, nearly black in basal half of tube, extreme front of head paler; legs about concolorous with body, but with femora slightly paler than tibiae and tarsi; fore wings gray-brown; antennae pale grayish white in segment I, II pale in pedicel and medially in apical half, heavily shaded laterally, III pale yellowish in pedicel, remainder of antennae uniform blackish brown. Length about 1.2 mm. (distended, 1.6); dorsal surface virtually without sculpture; head 161, across eyes 140, across cheeks 152, at base 126, cheeks rounded

to eyes and to base; vertex rounded, rather than conical, median ocellus surpassing front margin of eyes; po. black, dilated and divided at apex, curved forward, 78 long, 122 apart, and 16 from eyes. Prothorax 100, 279 across coxae, am. minute, others black, ep. 134 and pointed, others formed like po., aa. 56, ml. 54, pm. 61, ex. 53; mesothorax 265 across anterior angles, mesonotal setae 50, knobbed; metathorax 270 posteriorly; fore wings 584. Abdomen 332 (at segment V); tube 98, 68 across basal collar, 66 subbasally, 33 at apex, sides parallel in basal sixth, straight and converging beyond, terminal setae 121; segments I and II each with one large seta, that on I black and knobbed, that on II black basally, pale apically, and pointed; inner seta on III 146; setae I-III on IX pointed, 191-193. Antennal segments: I 33(34), II 46(28), III 39(22), IV 45(25), V 41(22), VI 46(22), VII 45(20), VIII 35(13); major sense-cones slender, III-VI each with a major one on either surface, VII with a dorsal one.

♀, forma aptera: Nearly identical with long-winged form in color and structure.

♂ (apterous): Nearly identical with female, though smaller (length about 0.92 mm., distended, 1.2).

BRAZIL: Nova Teutonia, S. C., Jan. 12 and 28 (2 apterous ♀ ♀), and May (1 macropterous ♀, holotype; 10 apterous ♀ ♀, including morphotype; and 6 ♂ ♂, including allotype), 1949, Fritz Plaumann, from dead branches.

Lissothrips ventralis, sp. nov.

Much like *pallipes* in that the abdominal setae are all pointed, the antero-marginals minute or wanting, the mesonotum without a pair of major setae at anterior angles, the postocular and all prothoracic setae tapered and pointed; but differing in having a pair of pores on the median tergite of first abdominal segment, the legs brown (only the distal ends of femora yellowish), segments III and IV of antennae dark (except for pale pedicel of III), abdomen paler in the three basal segments.

♀ (apterous): General color brown, nearly black in basal half of tube; antennae with segment I pale yellowish, II slightly darker because shaded with brown, III-VIII dark blackish brown but III pale yellow in pedicel and nearly black just beyond, and IV and V slightly darker basally. Length about 1.2 mm. (distended, 1.6); dorsal surface smooth and shining, but with distinct cross-lines in posterior part of head, in mesonotum, metanotum, and median tergite of first abdominal segment. Head 150, across eyes 130, across cheeks 131, in front of slight basal collar 117; eyes 50, about 35 wide and 61 apart; po. curved forward, chord 70, 103 apart, 13 behind eyes; mouth-cone 85, broadly rounded. Prothorax 100, 253 across coxae, am. and aa. minute, ml. 52, ep. 84, pm. 71, ex. 28; mesothorax 224 across anterior angles, metathorax 237 posteriorly. Abdomen 451 (at segment III); tube 96, 65 across basal collar, 63 just beyond, 37 at apex, sides slightly concave at basal third, terminal setae 37; setae on IX pointed, 67-75; dorsal setae on III-VI long, nearly black, that on III 120. Antennal segments: I 33(34), II 47(29), III 43(21), IV 51(27), V 55(27), VI 54(25), VII 43(19), VIII 30(10); major sense-cones slender, III with none, IV 1(2), V 1(1), VI 1(1), VII 1 dorsal.

BRAZIL: Nova Teutonia, S. C., Jan. 12 (1 ♀, holotype) and 13 (1 ♀, paratype), 1949, Fritz Plaumann, from dry branches.

Phthirothrips nemoralis, sp. nov.

Comparable only with *morgani*, with which it agrees in having 7-segmented antennae, without trace of suture, either dorsally or ventrally, between the morphological seventh and eighth segments; but with segment VII (47μ) little more than 1.2 times as long as VI (39μ), III with a long sense-cone on inner surface, po. and prothoracic setae moderately dilated at tip, am. 31, aa. 25, and occipital line only 7μ (instead of 15) from posterior margin of head at median line, where it is arched backward.

♀ (apterous): Color almost uniform blackish brown, with tarsi, apical half of tube, and segment III of antennae somewhat paler, the last with pedicel yellow; setae brown, those on abdomen paler apically. Length about 0.85 mm. (distended, 1.1); dorsal surface smooth and shining, free of sculpture except for a few cross-lines along anterior margins of mesonotum and abdominal segments I and IX. Head 90, across eyes 90, across cheeks 93, near base 91, across basal collar 93; eyes 31, about 20 wide, and about 51 apart; po. 40, 75 apart, 4 from eyes, slightly dilated at apex; mouth-cone extending 45 beyond posterior margin of head. Prothorax 90, 196 across coxae; all major setae present, formed like po., am. 31, aa. 25, ml. 40, ep. 50, pm. 45, ex. 38; mesothorax 168 across anterior angles, mesonotal seta 41; metathorax 161 wide posteriorly. Abdomen (at segment IV) 230; tube 70, across basal collar 51, subbasally 49, at apex 23, sides parallel in basal fourth, straight and converging beyond, terminal setae 54; all major setae on I-VIII at least slightly dilated at tip excepting seta II on VII and VIII, these and all on IX and X pointed; seta I on IX 106, II 115, III 123. Antennal segments: I 23(27), II 34(24), III 24(19), IV 28(22), V 31(21), VI 39(20), VII 47(17); major sense-cones on III 1(0), IV-VI 1(1), VII with 1 on outer surface.

BRAZIL: Belém, Pará, Aug. 11, 1951, J. D. H., 1 ♀ (holotype), from dead leaf of *Ravenala guianensis* in dense capoeira.

Terthrothrips *(?)*[3] **consobrinus**, sp. nov.

Allied to *clavivestis* by the knobbed major body setae, of which two pairs arise from sides of pterothorax, and by the reticulate sculpture at sides of head; but with the notch at posterior angles of eyes distinctly closer to tip of frontal costa than to posterior dorsal margin of head, the tube only two-thirds as long as head and 2.4 times as long as greatest subbasal width, and the po. and prothoracic setae shorter.

♀ (macropterous): Body brown, legs nearly yellow; fore wings brown, darkest in anal area, slightly paler basally; antennae dark brown in

[3] In the present state of knowledge of the fifteen or more genera which belong in the immediate vicinity of *Terthrothrips*, it is impossible to assign species to any one of them with precision. In this paper the writer has placed in *Terthrothrips*, *Porcothrips*, and *Orthothrips*—whose type species he has never seen—a number of forms which in each case probably do not belong together and which may well belong elsewhere. The separation of these and other allied genera on the basis of the characters now used results in so many puzzling cross-resemblances that one wonders whether we have not in effect cut across the grain, rather than with it, and whether we had not better adopt a cautious attitude toward the creation of more genera in this group until at least a goodly portion of the described ones can be studied by some reviewer who has access to the several type species.

segments I and II, light brown beyond, III somewhat paler than the others and lightly shaded just beyond base, IV and V somewhat paler to first whorl of setae. Length about 1.3 mm (distended, 1.7). Head 183, rather lightly reticulate dorsally, across eyes 137, just behind eyes 120, across cheeks 131, near base 115, length in front of postocular notch 86, behind it 96; eyes 68, width 45, interval 47; po. 47, curved, dilated and diagonally truncated at apex, 107 apart, 12 from eyes. Prothorax 89, 207 across coxae; major setae dark brown, formed like po., am. minute and pointed, aa. 32, ml. 41, ep. 68, pm. 107, ex. 14; mesothorax 180 across anterior angles, metathorax 230; fore wings 700. Abdomen 239 at III and IV; tube 123, base 50, apex 29, terminal setae 63, colorless and very slightly dilated at tip; seta II on IX 117, III 90, II with pale, perceptibly dilated tip, III pointed. Antennal segments: I 54(33), II 52(26) III 84(25), IV 100(24), V 94(20), VI 64(17), VII 45(16), VIII 45(10); II with a few faint transverse striae in basal half, III without shelf-like thickening near base; sense-cones long and slender, the major ones as follows: III 1(2), IV 2(2), V and VI 1(1), VII 1 dorsal.

BRAZIL: Nova Teutonia, S. C., Aug., 1952, Fritz Plaumann, 1 ♀ (holotype).

Terthrothrips *(?)* **striaticeps**, sp. nov.

Very much like *clavivestis* in having knobbed setae, two pairs of which arise from sides of pterothorax; but with the sculpture at sides of head striate, the striae parallel and transverse, notch at posterior angles of eyes midway between tip of frontal costa and base of head at median line.

♀ (macropterous): Color dark brown, legs yellow; fore wings brown, darkest in anal area, slightly paler basally; antennae dark brown in segments I and II, paler beyond, III somewhat paler than the others and lightly shaded just beyond base, IV and V somewhat paler to first whorl of setae. Length about 1.4 mm. (distended, 1.8). Head 197, more reticulate than striate medially, across eyes 153, just behind eyes 136, across cheeks 148, near base 134, length in front of postocular notch 98, behind it 98; eyes 70, width 49, interval 56; po. 46, dark brown, curved, dilated and diagonally truncated at apex, 116 apart, 10 from eyes. Prothorax 96, 241 across coxae, am. minute and pointed, others dark brown and formed like po., aa. 44, ml. 73, ep. 82, pm. 80, ex. 19; mesothorax 251 across anterior angles, metathorax 266; fore wings 770. Abdomen 290 at III and IV; tube 137, base 59, apex 33; terminal setae 71, colorless and very slightly dilated at tip; seta I on IX dilated apically and 103 long, II with tip very slightly dilated and 123 long, III 106, pointed. Antennal segments: I 43(39), II 51(28), III 98(26), IV 108(26), V 95(23), VI 61(20), VII 44(18), VIII 42(12); II, III, and sense-cones as in *consobrinus*.

BRAZIL: Nova Teutonia, S. C., Aug., 1952, Fritz Plaumann, 1 ♀ (holotype).

Terthrothrips *(?)* **longulus**, sp. nov.

Very much like *clavivestis* in having knobbed setae, two pairs of which arise from sides of pterothorax; but with the head nearly 1.5 times as long as width across eyes, the tube especially long and slender, and

antennal segments III-V yellow in pedicel, the head reticulately sculptured, more delicately so in an arc including po. and occ. setae.

♀ (macropterous): Color dark brown, legs yellow; fore wings brown, darker apically; antennae dark brown in segments I and II, paler beyond, III paler than the others, it and IV and V clear yellow to first whorl of setae. Length about 1.5 mm. (distended, 1.7). Head 218, across eyes 147, just behind eyes 128, across cheeks 142, near base 129, length in front of postocular notch 103, behind it 114; eyes 76, width 47, interval 33; po. 64, dark brown, curved, dilated and diagonally truncated at apex, 116 apart, 23 from eyes. Prothorax 114, across coxae 241, am. minute and pointed, others dark brown and formed like po., aa. 54, ml. 71, ep. 89, pm. 87, cx. 18; mesothorax 231 across anterior angles, metathorax 273; fore wings 833. Abdomen 274 at III; tube 161, base 59, apex 32; terminal setae 95, colorless and very slightly dilated at tip; seta II on IX 135, its tip colorless and very slightly dilated, III 115, pointed. Antennal segments: I 42(39), II 57(30), III 81(28), IV 113(29), V 110(25), VI 75(22), VII 45(20), VIII 55(15); II, III, and sense-cones as in *consobrinus*.

BRAZIL: Nova Teutonia, S. C., Aug., 1952, Fritz Plaumann, 1 ♀ holotype).

Terthrothrips *(?)* **cochlearius**, sp. nov.

Differing from *clavivestis*, *consobrinus*, *striaticeps*, and *longulus* as follows: (1) fore femora without knobbed setae, (2) antennal segments II, III, and IV with their apical dorsal setae finely pointed; but allied with them in having two pairs of outstanding knobbed pterothoracic setae; and differing from the next three species (*minor*, *crassus*, and *gracilis*) in (a) lacking a pale, less-sclerotized, subbasal ring on antennal segments IV and V, (b) dorsum of head transversely sculptured throughout, (c) coxal seta short, less than half the length of postoculars, (d) outer margin of metascutellum not hook-shaped, (e) hind wings without a minute, nearly black dot between each two fringing hairs in distal half of posterior margin, and (f) major setae on thorax and abdomen largely golf-club-shaped.

♀, macropterous: Color dark brown, legs brownish yellow; fore wings brown, scarcely paler at base; antennae dark brown in segments I, II, and VI-VIII, III yellow but lightly shaded with brown beyond pedicel, IV brownish yellow to first whorl of setae, brown beyond, V dark brown but yellowish in pedicel. Length about 1.4 mm. (distended, 1.7). Head 177, across eyes 145, behind eyes 137, across cheeks 148, at base 132, length in front of postocular notch 87, behind it 90; eyes 63, width 43, interval 60; po. 51, curved, dilated and diagonally truncated at tip, 115 apart, 13 from eyes. Prothorax 90, across coxae 234, with a few fine striae posteriorly; major setae brownish yellow, formed like po., am. minute and pointed, aa. 66, ml. 76, ep. 84, pm. 100, cx. 21; mesothorax 255 across anterior angles, metathorax 274 posteriorly; fore wings 658. Abdomen 288 at segment III; tube 137, across base 64, at tip 32; terminal setae 84, pointed; seta I on IX 134, II 151, III 131, all pointed. Antennal segments: I 38(36), II 52(28), III 68(29), IV 72(28), V 67(26), VI 55(23), VII 43(20), VIII 46(13); II not distinctly sculptured, III without subbasal shelf; major sense-cones as in *consobrinus*.

BRAZIL: Nova Teutonia, S. C., August, 1952, Fritz Plaumann, 2 ♀ ♀ (including holotype).

Terthrothrips *(?)* minor, sp. nov.

Like *cochlearius* in the two numbered characters in its description, and like it and its allies in having two pairs of outstanding knobbed pterothoracic setae; but differing from *cochlearius* in all of the following characters: (a) antennal segments IV and V with a pale, less-sclerotized, subbasal ring, (b) dorsum of head not sculptured medially, (c) coxal seta longer, more than one-half the length of postoculars, (d) outer margin of metascutellum shaped like a salmon hook with turned-up eye, the point of the hook outward, (e) hind wings with a minute, nearly black dot between each two fringing hairs in distal half of posterior margin, and (f) major setae on head, thorax, and abdomen knobbed, but not golf-club-shaped; differing from the next two species (*crassus* and *gracilis*) in that the head is about as wide across eyes as across cheeks.

♀ (macropterous): Color brown, head somewhat darker than thorax, legs brownish yellow; fore wings brown, darkest in anal area, slightly paler basally; antennae dark brown, darkest in I and II, pale in about basal fourth of III and in the subbasal ring of IV and V. Length about 1.2 mm. (distended, 1.5). Head 149, with a few striae at base and at extreme sides, across eyes 126, just behind eyes 114, across cheeks 124, near base 112, length in front of postocular notch 72, behind it 75; eyes 57, width 39, interval 49; po. 60, curved, dilated at tip, 85 apart, 13 from eyes. Prothorax 95, across coxae 202; major setae yellowish brown, formed like po., am. minute and pointed, aa. 40, ml. 54, ep. 52, pm. 62, cx. 28; mesothorax 196 across anterior angles, metathorax 217; fore wings 613. Abdomen 213 at segment III; tube 107, across base 54, at tip 29; terminal setae 57, tips colorless and very slightly dilated; seta I on IX 90 and knobbed, II 105 and very slightly dilated, III 93 and pointed. Antennal segments: I 30(29), II 44(26), III 57(24), IV 69(24), V 73(23), VI 51(20), VII 37(16), VIII 37(11); II, III, and sense-cones as in *consobrinus*.

♂ (macropterous): Smaller and more slender than ♀, but otherwise nearly identical.

BRAZIL: Nova Teutonia, S. C., Aug., 1952, Fritz Plaumann, 10 ♀ ♀ (including holotype) and 2 ♂ ♂ (including allotype).

Terthrothrips *(?)* crassus, sp. nov.

Like *cochlearius* and *minor* in the two numbered characters in the description of the former and in the possession of two pairs of outstanding knobbed pterothoracic setae, agreeing with *minor* in the lettered characters (a-f), but differing from this latter species most conspicuously in having the head broader across cheeks (149μ) than across eyes (142μ) and the postocular notch much farther from base of head (102μ) than from tip of frontal costa (80μ).

♀ (macropterous): Color yellowish brown, tube darkest but narrowly pale across base, legs yellow; fore wings gray-brown, darkest in anal area and apically, pale in basal fourth; antennae dark brown, darkest in I and II, pale in about basal fourth of III and in the subbasal ring on IV and V. Length about 1.4 mm. (distended, 1.6). Head 182, sculptured

only at sides, across eyes 142, just behind eyes 134, across cheeks 149, near base 136, length in front of postocular notch 80, behind it 102; eyes 57, width 38, interval 67; po. 68, nearly straight, dilated at tip, 109 apart, 17 from eyes. Prothorax 113, across coxae 242; major setae yellow, formed like po., am. minute and pointed, aa. 50, ml. 71, ep. 69, pm. 82, cx. 30; mesothorax 241 across anterior angles, metathorax 253; fore wings 644. Abdomen 255 at segment III; tube 140, across base 65, at tip 35; terminal setae 83, tips colorless and very slightly dilated; seta I on IX 137 and slightly dilated, II 157 and even less dilated, III 156 and pointed. Antennal segments: I 39(38), II 53(28), III 67(28), IV 78(29), V 80(27), VI 63(23), VII 44(20), VIII 46(13); II, III, and sense-cones as in *consobrinus*.

BRAZIL: Nova Teutonia, S. C., Aug., 1952, Fritz Plaumann, 1 ♀ (holotype).

Terthrothrips *(?)* **gracilis**, sp. nov.

Like *cochlearius, minor,* and *crassus* in the two numbered characters the description of the first of these and in the possession of two pairs of outstanding knobbed ptrothoracic setae, agreeing with *minor* and *crassus* in the lettered characters (a-f) in the description of the former, but differing from both in having more slender antennae (segment V about four times as long as wide, instead of about three times), and the more prominent eyes, the distance across the latter greater than the distance across cheeks.

♀ (macropterous): Color brown, head somewhat darker than thorax, legs brownish yellow; fore wings gray-brown, nearly colorless in basal fourth; antennae dark blackish brown, pale in basal ninth or tenth of III and in a subbasal ring on IV-VI. Length about 1.4 mm. (distended, 1.8). Head 179, with a few striae at base and at extreme sides, across eyes 143, just behind eyes 126, across cheeks 137, near base 122, length in front of postocular notch 89, behind it 90; eyes 67, width 48, interval 47; po. 67, slightly curved, dilated at tip, 102 apart, 12 from eyes. Prothorax 106, across coxae 224; major setae yellowish brown, formed like po., am. minute and pointed, aa. 56, ml. 63, ep. 61, pm. 78, cx. 49; mesothorax 217 across anterior angles, metathorax 248; fore wings 728. Abdomen 263 at segment IV; tube 118, across base 55, at apex 27; terminal setae 61, tips colorless and very slightly dilated; seta I on IX 100 and knobbed, II 110 and very slightly dilated, III 106 and pointed. Antennal segments: I 36(33), II 51(27), III 70(25), IV 92(25), V 94(23), VI 63(19), VII 45(16), VIII 46(10); II, III, and sense-cones as in *consobrinus*.

BRAZIL: Nova Teutonia, S. C., Aug., 1952, Fritz Plaumann, 1 ♀ (holotype).

Terthrothrips *(?)* **fuscatus**, sp. nov.

Like *gracilicornis* and the three species described below in (1) lacking the two pairs of prominent outstanding pterothoracic setae of the *clavivestis* group, and (2) all femora and tibiae rather closely covered with minute setae, but the femora without knobbed setae; unlike *gracilicornis* in having a very narrow reticulated area on metascutellum extending nearly to its posterior margin, width across eyes more than 1.2 times width just behind them, and length behind postocular notch about 1.2

times length in front of it; very unlike following three species in coloration (legs yellowish brown, with yellow knees, fore tibiae darkest, antennae brown, paler and more grayish in last two or three segments, IV and V each with a nearly white subbasal ring), and in that anterior angles of pronotum are produced to form a distinct tooth.

♀, macropterous: Color brown, paler in head and prothorax and nearly yellow in anterior part of head, blackish in about first six abdominal segments, tube paler apically, fore wings yellowish brown. Length about 1.4 mm. (distended, 1.8). Head 221, cross-striate medially, at base, and at sides, the cheeks finely serrate, width across eyes 145, behind eyes 113, across cheeks 144, near base 136, length in front of postocular notch 100, behind it 120; eyes 67, width 43, interval 60; po. 71, brownish yellow, dilated at tip, straight, 71 apart, and 17 from eyes. Prothorax 131, across coxae 256, faintly striate posteriorly, anterior margin somewhat thickened; am. minute and pointed, other setae formed and colored like po., aa. 68, ml. 77, ep. 80, pm. 81, cx. 53; mesothorax 245 across anterior angles, metathorax 263 posteriorly; wings 700; for tibiae serrate along inner surface, each tooth supporting a slender seta. Abdomen 333 (at segment III); tube 122, across base 65, at tip 33, terminal setae 63, their tips colorless and very slightly dilated; lower seta on posterior angles of II pointed; setae on IX 108-116, I and II dilated apically, III pointed. Antennal segments: I 45(38), II 57(30), III 108(27), IV 90(26), V 84(25), VI 67(22), VII 50(20), VIII 53(12); II not distinctly sculptured; III without shelf beyond base, sides of basal two-thirds concave because of a well-differentiated pedicel basal to first whorl of setae, this whorl only slightly basal to middle of segment; all setae pointed; major sense-cones on III and IV 1(2), on V and VI 1(1).

♂ (brachypterous): Like ♀ in color and general structure, but with fore femora swollen and bent; abdominal sternum IX almost wholly occupied by grandular tissue, but this disposed in two areas separated by a median, straight, unmodified area.

BRAZIL: Nova Teutonia, S. C., August, 1952, Fritz Plaumann, 1♀ (holotype) and 3♂♂ (including allotype).

Terthrothrips *(?)* unicinctus, sp. nov.

Like *fuscatus* in having a very narrow reticulated area on metascutellum extending nearly to its posterior margin, but with legs, base of head, abdominal segment II, and anterior portion of III, yellow, antennae with segments III-V yellow basally, IV and V without noticeable pale subbasal ring, III without well-differentiated pedicel (sides of basal two-thirds scarcely concave), the first whorl of setae decidedly basal to middle of segment, head about 1.6 (instead of 1.5) times as long as width across eyes, eyes less strongly protruding (width across them about 1.2 times that of head at postocular notch), and pronotum not toothed at anterior angles, male with abdominal segment IX yellow, its sternum almost wholly occupied by a single glandular area.

♀, forma macroptera: Color brown, except as noted above, prothorax paler, tube narrowly yellowish across base and pale apically; fore wings gray-brown, paler basally. Length about 1.4 mm. (distended, 1.8). Head 211, cross-striate at base and at sides, indistinctly so medially, ventrally devoid of sculpture except anteriorly and at sides, the cheeks faintly serrate, width across eyes 129, behind eyes 109, across cheeks

131, at base 120, length in front of postocular notch 95, behind it 116; eyes 62, width 38, interval 53; po. 67, brownish yellow, dilated at tip and slightly curved, 77 apart and 14 from eyes. Prothorax 112, across coxae 228, faintly striate posteriorly, anterior margin somewhat thickened, but without distinct tooth at anterior angles; am. minute and pointed, other setae formed and colored like po., aa. 55, ml. 60, ep. 68, pm. 76, cx. 43; mesothorax 217 across anterior angles, metathorax 230 posteriorly; fore wings 658; fore tibiae serrate along inner surface, each tooth supporting a slender seta. Abdomen 281 (at segment IV); tube 120, across base 63, at tip 32, terminal setae 65, their tips colorless but not dilated; lower seta on posterior angles of II pointed; setae on IX 103-106, I and II dilated apically, III pointed. Antennal segments: I 40(37), II 56(29), III 93(23), IV 79(23), V 77(22), VI 62(21), VII 48(18), VIII 50(11); II not distinctly sculptured; III without shelf beyond base; all setae pointed; major sense-cones as in preceding species.

♀, forma brachyptera: Like long-winged form in color and structure, with more or all of abdominal segment III yellow and with the abdomen nearly yellow medially.

♂ (macropterous): Color and structure as in female, except as noted above.

BRAZIL: Nova Teutonia, S. C., August, 1952, Fritz Plaumann, 3 macropterous ♀♀ (including holotype), 3 brachypterous ♀♀ (including morphotype), 2 macropterous ♂♂ (including allotype).

Terthrothrips *(?)* **serratus**, sp. nov.

Like *fuscatus* and *unicinctus* in sculpture of metascutellum, but differing conspicuously from former in unicolorous yellow legs and yellow bases of antennal segments III-V; differing from latter species in the unicolorous abdomen, the deeply serrate cheeks (smooth at extreme base; resulting from the heavy, thickened, transverse sculpture of sides of head), the transversely sculptured ventral surface of head, and the more slender antennae.

♀, forma macroptera: Color dark brown, prothorax paler and yellowish, tube narrowly pale across base and pale in apical third; fore wings gray-brown, very slightly paler basally. Length about 1.6 mm. (distended, 1.9). Head 228, lightly reticulate across base, cross-striate elsewhere (both dorsally and ventrally), the striae rugose along cheeks and median line, cheeks thus deeply serrate, width across eyes 136, behind eyes 114, across cheeks 139, near base 129, length in front of postocular notch 104, behind it 120; eyes 64, width 41, interval 55; po. 51, dark brown, dilated at tip, straight, 79 apart and 17 from eyes. Prothorax 123, across coxae 255, faintly striate posteriorly, anterior margin distinctly thickened, with low tooth at anterior angles; am. minute and pointed, other setae formed like po. but slightly paler, aa. 66, ml. 72, ep. 78, pm. 84, cx. 55; mesothorax 240 across anterior angles, metathorax 259 posteriorly; fore wings 686; fore tibiae serrate along inner surface, each tooth supporting a slender seta. Abdomen 316 (at segment III); tube 130, across base 64, at tip 34, terminal setae 63, their tips colorless but not dilated; lower seta on posterior angles of II pointed; setae on IX 99-103, I and II dilated apically, III pointed. Antennal segments: I 44(39), II 57(29), III 104(26), IV 102(24), V 95(23), VI 71(21), VII 58(19), VIII 59(11); II not distinctly sculptured; III without shelf

beyond base; all setae pointed; major sense-cones as in *fuscatus*.

♂, forma micropterа: Color as in ♀; fore legs enlarged, femora bent and minutely tuberculate on inner surface; fore wings extending to about fourth abdominal segment; glandular area as in *unicinctus*.

♂, forma brachyptera: Like micropterous ♂ except that wing-pads do not attain base of abdomen.

BRAZIL: Nova Teutonia, S. C., August, 1952, Fritz Plaumann, 12 ♀♀ (including holotype), 3 micropterous ♂♂ (including allotype), and 1 brachypterous ♂ (morphotype).

Terthrothrips *(?)* bicinctus, sp. nov.

Like *gracilicornis, fuscatus, unicinctus*, and *serratus* in the two numbered characters in the description of *fuscatus;* but differing from all of these in the absence of major aa. setae (as well as am.), the presence of two sense-cones (instead of one) on the inner surface of antennal segment IV, the absence of sculpture from the metascutellum in the median area anterior to the two major setae, the knobbed (instead of pointed) lower seta at posterior angles of abdominal segment II, and the distinctive coloration, the metathorax, abdominal segments IV and V, and the tube lemon-yellow, the latter tipped with gray.

♀, macropterous: Color dark brown, banded with pale yellow as described above, legs lemon yellow, middle and hind femora shaded with brown in basal half, the hind pair darkest, the antennae almost clear yellow beyond segment II, the last three segments very light gray; fore wings gray-brown, paler at base except for the dark anal area. Length about 1.4 mm. (distended, 1.7). Head 192, lightly reticulo-striate across base, heavily striate along cheeks, the latter thus serrulate, ventral surface distinctly striate except medially at base, width across eyes 145, least width just behind eyes 129, greatest width across cheeks 145, near base 135, length in front of postocular notch 95, behind it 97; eyes 67, width 44, interval 57; po. 84, yellowish gray, dilated at tip, nearly straight, 96 apart, 16 from eyes. Prothorax 110, across coxae 235, without sculpture, anterior margin only slightly thickened, without tooth at anterior angles; am. and aa. minute, other setae formed and colored like po., ml. 89, ep. 88, pm. 99, cx. 65; mesothorax 235 across anterior angles, metathorax 255 posteriorly; fore wings 700; fore tibiae scarcely serrate on inner surface. Abdomen 302 (at segment III); tube 133, across base 63, at tip 33, terminal setae 65, their tips colorless but not dilated; seta I on IX 122, II 132, both knobbed, III 105 and pointed. Antennal segments: I 40(37), II 54(27), III 74(26), IV 91(26), V 84(23), VI 70(20), VII 44(17), VIII 56(10); II not sculptured, III without shelf beyond base; all setae pointed; sense-cones as in *fuscatus*, except that IV has only one on inner surface.

BRAZIL: Nova Teutonia, S. C., August, 1952, Fritz Plaumann, 2♀♀ (including holotype).

Mystrothrips clavatoris, sp. nov.

Smaller than its congener and with large occipital setae, more slender antennae, only one sense-cone on outer surface of antennal segment III, two on either surface of IV.

♀, brachypterous: Color brown, head largely yellow but brown along sides, abdomen darkened medially in segments III-VIII; tarsi, trochan-

ters, knees, and tips of tibiae yellow; tube dark brown, paler apically, nearly yellow across base; antennae about concolorous with body, darker in segment II and apically, pedicels of III-VI yellow. Length about 1.6 mm. (distended, 1.9). Head 210, strongly polygonally reticulate, produced 11-14μ between eyes and antennae, across eyes 140, just behind eyes 116, across cheeks 148, near base 126, length in front of postocular notch 85, behind it 120, the notch forming nearly a right angle with cheeks; eyes 46, width 34, interval 73; po. 34, curved inward, dilated at tip, 110 apart, 24 from eyes; occ. 42, 77 apart, 13 behind po., formed like latter and like them nearly colorless and arising from low tubercles; cheeks with about seven pairs of similarly dilated but shorter setae. Prothorax 119, 263 across coxae, lightly reticulate over most of pronotum; all usual setae present, yellow, dilated at tip, am. 34, aa. 51, ml. 54, ep. 65, pm. 59, cx. and a pair directly between pm. each about 24; fore tarsal tooth small, acute; setae on legs mostly knobbed; mesothorax 252 across anterior angles, metathorax 266. Abdomen lightly reticulate, 396 across segment III; lateral setae on II-VII curved, most setae knobbed and yellow; I on IX 123, II 113, both knobbed, III 135 and pointed; tube 157, across base 67, at tip 27, sides straight, greatest thickness of wall fully 9; terminal setae 87, pale, dilated at tip. Antennal segments: I 43(37), II 53(34), III 69(30), IV 65(30), V 65(27), VI 55(23), VII 43(20), VIII 43(12); II lightly reticulate; most setae on I-V dilated at tip; sense-cones on III, V, and VI 1(1), IV 2(2), all of them long and slender.

♂, brachypterous: Essentially like female in color and structure; sternum VIII of abdomen with transversely elliptical grandular area at middle 45x34.

BRAZIL: Nova Teutonia, S. C., August, 1952, Fritz Plaumann, 2 ♀♀ (including holotype) and 1 ♂ (allotype).

Porcothrips *(?)* **subcalvus**, sp. nov.

Like *caelatoris* in having (1) two pairs of outstanding knobbed setae arising from sides of pterothorax, (2) abdominal sterna III-VIII without a transverse row of strong setae, (3) inner apical dorsal seta on antennal segment I knobbed, and (4) head strongly polygonally reticulate; differing from it most conspicuously in the very short setae throughout, the presence of only one major sense-cone on either surface of segment IV of antennae, and the much shorter tube.

♀, apterous: Color blackish brown, with head yellow between and in front of eyes, segment IX of abdomen paler, II-VIII with median third abruptly darkened, tube yellow across base and paler apically; legs paler than body, with tarsi, trochanters, bases of tibiae, and apices of femora yellow; antennae with segments I and II pale yellow to brownish yellow, III-V brown, successively darker, III pale yellow in about basal fifth, VI-VIII dark gray-brown. Length about 1.3 mm. (distended, 1.5). Head 157, heavily reticulate with dark lines, elevated and swollen across occiput, cheeks rounded, width across eyes 132, behind eyes 124, across cheeks 138, near base 108, length in front of postocular notch 68, behind it 82; eyes 46, 33 wide, 67 apart; po. 17, curved, dilated at tip,, 122 apart and 12 from eyes; occ. minute (8), pointed, 56 apart, only about 2 behind po. Prothorax 114, 195 across coxae, striate posteriorly, remainder lightly reticulate; am. and a pair between pm. minute and

pointed, others formed like po., light brown, aa. 27, cx. 13, others 16-19; mesothorax 190 across anterior angles, metathorax 186 posteriorly, their knobbed ventro-lateral setae short and comparable with po. Abdomen 298 at segment IV, terga and sterna reticulate (except posteriorly); tube 103, subbasal width 52, apex 24, sides straight beyond base; terminal setae 57; other setae mostly knobbed, IX with I 49, II 73 (both knobbed), III 64 and pointed. Antennal segments: I 34(33), II 46(27), III 57(23), IV 50(25), V 49(23), VI 43(20), VII 32(18), VIII 34(12); II lightly reticulate; apical dorsal setae on III-V mostly knobbed.

BRAZIL: Nova Teutonia, S. C., August, 1952, Fritz Plaumann, 7 ♀♀ (including holotype).

Porcothrips *(?)* caelatoris, sp. nov.

Like *subcalvus* in the four numbered characters in its description, differing from it as mentioned, the tube much longer and slenderer and equal in length to head.

♀, brachypterous: Color brown, head darkened at sides, abdomen with segment IX paler, otherwise nearly concolorous throughout, except for the tube, which is paler at either end; legs yellow, with femora and tibiae broadly shaded at middle; antennae nearly uniform dark brown, with medial apical portion of segment II yellowish and about basal fifth of III yellow. Length about 1.1 mm. (distended, 1.4). Head 140, reticulated with dark lines, elevated and swollen across occiput, cheeks rounded, width across eyes 111, behind eyes 103, across cheeks 122, near base 105, length in front of postocular notch 59, behind it 80; eyes 34, 26 wide, 60 apart; po. 37, curved, dilated and diagonally truncate at tip, 105 apart and 13 from eyes; occ. 17, very slender and pointed, 52 apart and averaging 11 behind po. Prothorax 86, 192 across coxae, striate along reflexed posterior margin and in front of pm., smooth elsewhere; am. and a pair between pm. minute and pointed, others large, formed like po., yellow, aa. 43, ml. 47, ep. 49, pm. 63, cx. 21; mesothorax 178 across anterior angles, metathorax 178, their knobbed ventro-lateral setae long and comparable with prothoracics. Abdomen 232 at segment III; tube 140, subbasal width 53, apex 26, sides straight; terminal setae 74; other setae mostly knobbed, IX with I 118 and knobbed, II 144, III 117, these last two pointed. Antennal segments: I 33(30), II 46(27), III 50(26), IV 47(26), V 46(26), VI 44(23), VII 37(19), VIII 39(14); II lightly reticulate; III, V, and VI with major sense-cones 1(1), IV 2(2); apical dorsal setae on III-V mostly knobbed.

BRAZIL: Nova Teutonia, S. C., August, 1952, Fritz Plaumann, 1♀ (holotype).

Porcothrips *(?)* forticauda, sp. nov.

Like *subcalvus* and *caelatoris* in the first three numbered characters in the description of the former, but with dorsum of head lightly reticulate across base and more strongly so at sides, smooth in occipital area, and antennal segment III with two sense-cones (instead of one) on outer surface.

♀, brachypterous: Color golden yellow, thorax lightly shaded with brown, pterothorax somewhat darker than prothorax, tube nearly yellow in basal half, shading to dark brown beyond; legs brownish yellow, all femora and tibiae shaded, the latter somewhat darker; antennae with

segment I pale yellow, II yellowish brown, III-VIII deep brown with pedicel of III yellow. Length about 1.5 mm. (distended, 1.9). Head 211(199), across eyes 153(157), just behind eyes 144(150), across cheeks 162(167), near base 152(152), length in front of postocular notch 86(84), behind it 124(115); eyes 58, width 43, interval 67; po. 60, nearly straight, asymmetrically dilated at tip, brownish yellow, 119 apart and 17 from eyes; occ. 19, very slender and pointed, 58 apart and about 27 behind po. Prothorax 134, 286 across coxae, with a few striae along posterior margin, smooth elsewhere; am. and pair between pm. minute and pointed, others large, colored and formed like po., aa. and ml. 57-59, ep. 80, pm. 74, ex. 31; mesothorax 279 across anterior angles, metathorax 277 posteriorly. Abdomen 398 across segment IV; tube 157(152), across base 82(79), apex 33(32), sides slightly concave apically, its walls thickened (13); terminal setae 104; other setae mostly knobbed like po., brownish yellow, IX with seta I 127, II 143, both slightly dilated at tip, III 134 and pointed. Antennal segments: I 44(43), II 52(33), III 68(31), IV 74(30), V 75(26), VI 64(24), VII 49(22), VIII 45(15); II lightly reticulate; major sense-cones on III 1(2), IV 2(2), V and VI 1(1).

♂, brachypterous: Like female in color and structure; sternum VIII of abdomen with narrow glandular area occupying all of anterior margin.

BRAZIL: Nova Teutonia, S. C., August, 1952, Fritz Plaumann, 26 ♀ ♀ (including holotype) and 7 ♂ ♂ (including allotype).

Porcothrips *(?)* **bisetosus**, sp. nov.

Unlike the three preceding species and like the four which follow in having (1) no outstanding knobbed latero-ventral pterothoracic setae, (2) abdominal sterna III-VIII each with a transverse row of long setae, and (3) antennae with all setae pointed; unlike the following four species in having the median pair of setae on abdominal terga II-VIII large, dark, and about half as long as the tergum itself.

♀, brachypterous: Color yellowish brown, heavily shaded with brown in abdominal segment II, III-VIII or IX successively paler though usually darkened at sides, tube narrowly nearly yellow across base and pale apically, its remainder as dark as II, prothorax somewhat darkened, head nearly or quite yellow; legs yellow, with femora and tibiae shaded with brown except ends; antennae with first two and last three segments dark brown, II yellowish apically, III-V deep yellow, IV and V successively darker because shaded with brown. Length about 1.6 mm. (distended, 2.0). Head 228, polygonally reticulate with light lines across basal fourth, along sides, and in ocellar area, remainder of dorsum smooth, cheeks finely serrate, broadly rounded and forming a right angle at postocular notch, width across eyes 137, just behind eyes 120, across cheeks 163, near base 138, length in front of notch 79, behind it 148; eyes 50, 39 wide, 60 apart; po. 56, straight, dilated, concolorous with head, 87 apart, 17 from eyes; occ. 30, very slender and pointed, 50 apart, 21 behind po. Prothorax 137, 273 across coxae, lightly striate along posterior margin, smooth elsewhere; am. and pair between pm. minute and pointed, others large, colored and formed like po., aa. ml. and ep. 59-60; pm. 65, ex. 43; mesothorax 238 across anterior angles, metathorax 232 posteriorly. Abdomen 421 across segment IV; tube 140, across base 86, apex 38, sides nearly straight; terminal setae 104; other

setae mostly knobbed, yellow, IX with I 97, II 101, III 125, the first two slightly knobbed. Antennal segments: I 45(40), II 56(34), III 68(30), IV 61(29), V 62(27), VI 56(25), VII 47(23), VIII 49(13); II very lightly reticulate; III and IV with major sense-cones 1(2), V and VI 1(1).

♂, brachypterous: Like female in color and structure; sternum VIII of abdomen with narrow glandular area occupying anterior margin.

BRAZIL: Nova Teutonia, S. C., August, 1952, Fritz Plaumann, 8 ♀ ♀ (including holotype) and 8 ♂ ♂ (including allotype).

Porcothrips *(?)* simplex, sp. nov.

Like *bisetosus* in the three numbered characters in its description, but with the median pair of setae on abdominal terga II-VIII minute; most conspicuously unlike the following three species in having the metathorax brown and darkest.

♀, forma macroptera: Color brownish yellow, with pterothorax brown and abdominal segments III-VIII successively darker because shaded with brown (especially anteriorly), each of these segments with a median transverse dash of brown bordering subbasal line posteriorly, IX shaded at sides; tube yellow across base, briefly washed with yellowish brown in remainder of basal third, yellow beyond, faintly tipped with gray; head brown in ocellar area; legs brownish yellow, tarsi yellow; fore wings light gray-brown, darkest basally; antennae dark brown, segments I and II more yellowish, II yellow apically, III yellow at base. Length about 1.6 mm. (distended, 2.0). Head 227, polygonally reticulate with light lines across basal fourth and along sides, with dark lines in ocellar area, remainder of dorsum smooth; cheeks serrate, only slightly convex, forming nearly a right angle at postocular notch; width across eyes 154, behind eyes 133, across cheeks 165, near base 153, length in front of postocular notch 93, behind it 133; eyes 63, width 48, interval 59; po. 71, straight, slightly dilated, yellow, 91 apart and 23 from eyes; occ. 27, very slender and pointed, 67 apart, 24 behind po. Prothorax 130, 287 across coxae, lightly striate along posterior margin, smooth elsewhere; am. and pair between pm. minute and pointed, others large, colored and formed like po., aa. and ml. 61-62, ep. 82, pm. 92, cx. 28; mesothorax 307 across anterior angles, metathorax 325 posteriorly, fore wings 766. Abdomen 355 across segment III; tube 149, across base 80, apex 38, sides straight; terminal setae 99; other setae mostly knobbed, yellow, IX with I and III 161, II 144, all pointed. Antennal segments: I 47(44), II 59(38), III 74(34), IV 66(34), V 68(29), VI 59(26), VII 50(23), VIII 47(15); II lightly reticulate; III and IV with major sense-cones 1(2), V and VI 1(1).

♀, forma brachyptera: Identical with macropterous form in color and in most details of structure; head of morphotype 217, across eyes 134, behind eyes 124, across cheeks 151, near base 143, length in front of occipital notch 80, behind it 136; eyes 47, width 32, interval 70.

BRAZIL: Nova Teutonia, S. C., August, 1952, Fritz Plaumann, 1 macropterous ♀ (holotype), 5 brachypterous ♀ ♀ (including morphotype).

Porcothrips *(?)* citricornis, sp. nov.

Like *bisetosus* and *simplex* in the three numbered characters in the description of the former, but unlike *bisetosus* in having small median

setae on abdominal terga II-VIII, and unlike *simplex* in coloration and in having seta I on IX knobbed; unlike the following two species in coloration and in lacking sculpture between the occipital setae.

♀, brachypterous: Color bright yellow, with fore coxae, prothorax, most of mesothorax, and abdominal segments I-III, IX, and X, brown; II of abdomen darkest, VIII shaded posteriorly; mesothorax and I of abdomen pale medially; head slightly darker than other yellow areas; tube yellowish across base and paler apically, legs brownish yellow, with middle and hind coxae, all trochanters and tarsi, and at least tips of tibiae pale yellow, all femora shaded with brown in about basal half; antennae bright yellow throughout. Length about 1.7 mm. (distended, 2.1). Head 241, lightly polygonally reticulate across basal fourth, along sides, and in ocellar area, remainder of dorsum smooth; cheeks serrate, slightly convex, forming a nearly right angle at postocular notch; width across eyes 157, behind eyes 133, across cheeks 170, near base 153, length in front of postocular notch 89, behind it 150; eyes 61, width 40, interval 77; po. 71, straight, with a circular dilation at tip, brownish yellow, 98 apart and 25 from eyes; occ. 18, very slender and pointed, 83 apart, 30 behind po. Prothorax 142, 312 across coxae, without sculpture; am. and an approximate pair behind pm. minute and pointed, others large, colored and formed like po., aa. 63, ml. 76, ep. 67, pm. 79, ex. 42; mesothorax 294 across anterior angles, metathorax 276 posteriorly. Abdomen 407 at segment III; tube 163, across base 86, apex 40, sides straight; terminal setae 106; other setae mostly with rounded knobs at tip, yellow, IX with seta I knobbed and 154, II 173 and nearly pointed, III 151, pointed. Antennal segments: I 49(44), II 59(33), III 85(29), IV 77(28), V 78(25), VI 60(24), VII 51(20), VIII 53(13); II lightly reticulate; III and IV with major sense-cones 1(2), V and VI 1(1).

BRAZIL: Nova Teutonia, S. C., August, 1952, Fritz Plaumann, 2 ♀♀ (including holotype).

Porcothrips *(?)* bifasciatus, sp. nov.

Like *bisetosus, simplex,* and *citricornis* in the three numbered characters in the description of the first of these, but unlike that species in having small median setae on abdominal terga II-VIII, unlike all three in coloration and in the sculptured median portion of occipital area; unlike *trifasciatus* in coloration, sense-cone arrangement, and chaetotaxy of pronotum.

♀, macropterous: Color yellow, with fore coxae, prothorax, anterior part of mesothorax, and abdominal segment II brown, sides of I and basal portions of III-V successively less darkly shaded, II-VIII with small dark blotch behind subbasal line; tube very narrowly yellow across base, dark brown in rest of basal third, yellowish brown beyond but shaded laterally to beyond middle, just distinguishably tipped with gray; head brown in ocellar area; legs yellow, lighter in tarsi, trochanters, and tips of tibiae, the femora (especially the hind pair) lightly washed with brown except at ends; antennae light brown, segment I and sides of II darkened, latter yellow at tip, III yellow in pedicel. Length about 1.6 mm. (distended, 1.9). Head 196, lightly polygonally reticulate dorsally excepting for an area on each side lying principally between po. and occ., the lines of reticulation dark in ocellar area, pale elsewhere;

cheeks finely serrate, broadly rounded to eyes, nearly parallel near base, strongly convex between; width across eyes 137, just behind eyes 118, across cheeks 148, near base 133, length in front of postocular notch 93, behind it 102; eyes 59, width 38, interval 61; po. 62, straight, with a circular dilation at tip, yellow, 99 apart and 21 from eyes; occ. 23, very slender and pointed, 56 apart and averaging 20 behind po. Prothorax 110, 255 across coxae, very finely cross-striate along posterior margin, smooth elsewhere; am. and a pair between pm. minute, fine, pointed, others large, colored and formed like po., aa. 63, ml. 66, ep. 84, pm. 90, ex. 46; mesothorax 249 across anterior angles, metathorax 272 posteriorly; fore wings 616. Abdomen 336 at segment IV; tube 135, across base 69, apex 39, sides nearly straight; terminal setae 102; other setae mostly with rounded knobs at tip, yellow, IX with seta I knobbed and 129, II dully pointed and 134, III pointed and 140. Antennal segments: I 39(39), II 57(34), III 67(31), IV 68(29), V 70(27), VI 62(24), VII 50(21), VIII 50(14); II lightly reticulate; III and IV with major sense-cones 1(2), V and VI 1(1).

BRAZIL: Nova Teutonia, S. C., August, 1952, Fritz Plaumann, 1 ♀ (holotype).

Porcothrips *(?)* trifasciatus, sp. nov.

Like *bisetosus*, *simplex*, *citricornis*, and *bifasciatus* in the three numbered characters in the description of the first of these, but unlike all of them in having two sense-cones on the inner surface of antennal segment IV and in the very minute antero-angular prothoracic setae.

♀, micropterous: Color yellow, with fore coxae and prothorax (more especially the sides of both) and plates at anterior angles of mesothorax, dark brown; another darker brown band occupying the first two abdominal segments, darkest at sides; and a third brown band (about as dark as that involving prothorax) terminating with segment VIII of abdomen, this band dark in VII but paler in VI and disappearing in V, II-VII with an obscure median transverse darker blotch along subbasal line; tube yellow throughout, more deeply so in basal half, faintly tipped with gray; head not brown in ocellar area; legs yellow, lighter in tarsi and trochanters, femora lightly washed with brown except at ends; antennae yellow in segment I, brownish yellow in II, rich dark brown beyond, III somewhat paler and yellow at extreme base. Length about 1.3 mm. (distended, 1.6). Head 183, rather lightly polygonally reticulate dorsally excepting in the immediate vicinity of po. and occ., the lines of reticulation pale; cheeks finely serrate, broadly rounded to eyes, constricted in front of basal collar, strongly convex between; width across eyes 128, behind eyes 118, across cheeks 141, near base 121, length in front of postocular notch 76, behind it 107; eyes 48, width 31, interval 66; po. 67, pale yellow, straight, very slightly dilated apically, 101 apart and 30 from eyes; occ. about 30, very slender apically and pointed, 70 apart and averaging 18 behind po. Prothorax 120, width 202 exclusive of coxae, finely cross-striate along posterior margin, smooth elsewhere; am., aa., and a closely approximate pair between pm. minute, fine, pointed, others large, colored and formed like po.; ml., ep., and pm. 72-73, ex. minute and pointed; mesothorax 248 across anterior angles, metathorax 251, fore wings 346. Abdomen 280 at segment III; tube 119, across base 74, apex 30, sides straight; terminal setae 64; other

setae mostly very slightly dilated at tip, yellow, IX with all setae pointed, I 135, II 130, III 121. Antennal segments: I 40(38), II 50(34), III 62(33), IV 58(34), V 56(32), VI 50(27), VII 42(22), VIII 42(16); II lightly reticulate; major sense-cones on III 1(2), IV 2(2), V and VI 1(1).

BRAZIL: Nova Teutonia, S. C., August, 1952, Fritz Plaumann, 1 ♀ (holotype).

Orthothrips longiceps, sp. nov.

Like *O. hylaeus* (Hood)[4] and *fuscipes* in the arrangement of the antennal sense-cones, the short, straight-sided, non-sculptured tube, and the relatively long seta I on abdominal segment IX; but with much longer, differently sculptured head and more slender antennae.

♀ (macropterous): Color brownish yellow, with sides of head and all of thorax darkened; tube dark blackish brown, slightly paler apically and distinctly yellowish across base; legs yellow, the femora and tibiae somewhat darkened with brown except at ends; antennae with segments I, II, and IV-VIII dark brown, I and IV-VI distinctly paler basally, II and IV pale apically, III yellow in pedicel, yellowish brown beyond. Length about 1.7 mm.; head (238) 1.5 times as long as width across eyes (157), slightly produced (8) between eyes and antennae, width across constriction just behind eyes 136; cheeks evenly convex, rounded to eyes and to slight basal collar, greatest width across them 153, near base 133; dorsal surface of head polygonally reticulate, but dorsally behind eyes with reticles elongated and more delicate, their axes inclined posteriorly and medially; po. yellow, curved, slightly dilated, 19 long, 125 apart, 22 from eyes; other cephalic setae short, pale, pointed, occ. about 12 long, 43 apart, and 34 behind eyes; eyes protruding, length 70, width 44, interval 69; prothorax 114, across coxae 244; pronotum nearly smooth at middle, lightly reticulate elsewhere, with am. minute, others curved, dilated, brown, aa. 31, ml. 16, ep. 34, pm. 40, cx. 10; mesothorax across anterior angles 279; fore wings 810; metathorax, greatest width 308, abdomen (at segment IV) 406; tube about 0.6 the length of head, sides straight, length 151, width at base 70, at apex 35, terminal setae blunt and 84 long; IX with I broadly rounded at tip and 105, II dully pointed and 138, III pointed and 128. Antennal segments: I 47(43), II 60(33), III 92(30), IV 100(30), V 91(25), VI 73(21), VII 50(20), VIII 56(13); III and IV each with about four knobbed setae.

BRAZIL: Nova Teutonia, S. C., Aug., 1952, 1 ♀ (holotype), Fritz Plaumann.

Orthothrips angustus, sp. nov.

Like *caudatus* in disposition of sense-cones on antennal segments III and IV, in short seta I on abdominal segment IX, and in long, non-sculptured tube; but with tube only 1.4 times as long as that part of head posterior to front margin of eyes, all major setae yellow or brown, postocular setae one-third the length of eyes, and head fully 1.3 times as long as width across eyes, this width about equal to that across cheeks.

♀ (macropterous): Color brownish yellow, with sides of head and of

[4]Referred from *Sagenothrips;* comb. nov.

thorax (especially the pterothorax) darkened; tube dark except at extreme base and subapically; legs yellow; antennae with segments I, VII, and VIII as dark as sides of head, remainder yellow with IV-VI shaded in apical half or more. Length about 1.9 mm.; dorsal surface of head and metathorax heavily polygonally reticulate, pronotum and sides of abdomen similarly, but not so heavily, sculptured; head, total length 230, slightly produced (8) between eyes and antennae, width across eyes 174, across constriction just behind eyes 161; cheeks rounding toward eyes, converging straightly to basal collar, greatest width across cheeks 172, in front of basal collar 155, across collar 160; po. 24 long, 141 apart, and 14 from eyes, light brown, curved, slightly dilated, other cephalic setae short and pointed; eyes protruding, length 78, width 49, interval 77; prothorax 122, across coxae 302, pronotum lightly reticulate throughout, am. minute, others dilated at tip, brownish yellow, ep. 55, others 23-29, cx. 16; mesothorax across anterior angles 315; metathorax, greatest width 336; fore wings 880; abdomen (at segment II) 365; tube much longer than head, slightly narrowed beyond base and at tip, otherwise with its thickened sides nearly straight, length 279, width at base 73, at tip 30, terminal setae 85; IX with I knobbed and 68 long, II and III pointed and 170 and 109. Antennal segments: I 44(41), II 58(33), III 81(31), IV 86(30), V 85 (26), VI 68(22), VII 53(19), VIII 51(14); III and IV each with at least five knobbed setae.

BRAZIL: Nova Teutonia, S. C., May, 1952, 1 ♀ (holotype), Fritz Plaumann.

Orthothrips fuscipes, sp. nov.

Like *hylaeus* and *longiceps* in the arrangement of the antennal sense-cones, the short, straight-sided, non-sculptured tube, and the relatively long seta I on abdominal segment IX; but with body and legs largely brown or blackish brown, abdomen with apical segments paler and largely brownish yellow; head shorter and antennae stouter than in *longiceps;* sculpture of head much as in *hylaeus* but major setae stout, straight, and conspicuous, the postoculars and those toward tip of abdomen light brown or yellowish, others nearly black.

♀ (brachypterous): Color of thorax and basal abdominal segments dark blackish brown, the head abruptly brownish yellow (shaded at sides), the abdomen paler in last few segments and obscurely dappled with brownish yellow across middle of each, the tube yellowish brown, tipped with gray; legs dark blackish brown, with tarsi and knees paler, mid and hind trochanters nearly yellow, fore femora and tibiae yellowish in apical half and at base, respectively; antennae brown, segment I palest, III-VI yellow to first whorl of setae. Length about 1.6 mm. (distended, 1.9).[5] Head 218, across eyes 148, behind eyes 133, across cheeks 158, near base 144, its form and sculpture much as figured for *hylaeus,* but more incised behind eyes; eyes 57, 40 wide, 67 apart; po. 50, 127 apart, 14 from eyes, straight, dilated, diverging. Prothorax 90, 276 across coxae, its surface lightly reticulo-striate, am. wanting, aa. 46, ml. 35, ep. 52, pm. 29, cx. 16, all except the last stout, dilated, and arising from tubercles; mesothorax 280 across anterior angles, metathorax 309. Abdomen 421 (at segment III); tube 195, base 77, apex 37, sides straight, terminal setae 90; segment IX, seta I 105, II 142, III 125. Antennal segments: I 44(40), II 53(33), III 75(30), IV 79(30), V

83(27), VI 67(25), VII 47(20), VIII 53(15); III and IV each with three knobbed setae.

BRAZIL: Nova Teutonia, S. C., August, 1952, Fritz Plaumann, 3 ♀♀ (including holotype).

Orthothrips variegatus, sp. nov.

Like *hylaeus, longiceps,* and *fuscipes* in the arrangement of the antennal sense-cones and the relatively long seta I on abdominal segment IX; but with the tube strongly constricted at apex, its remainder nearly parallel-sided, heavily reticulated in basal three-fifths; occ. setae large (37μ), knobbed, equal to po.; head strongly and abruptly depressed dorsally across base, and with its median reticles smaller and longitudinal, instead of with sides nearly equal.

♂ (macropterous): Color brownish yellow, with head and pterothorax shaded along sides and metanotal plate darkened; segments II-VII of abdomen darker posteriorly (at least at sides), III-VI each with a dark median blotch at base in which the dark lines of sculpture are conspicuous, VIII palest and brownish yellow, IX uniform dark brown, tube brownish yellow with sides shaded and constricted tip dark gray; all tarsi, trochanters, and knees nearly lemon-yellow, femora otherwise dark brown, the hind pair darkest, front pair palest; tibiae yellow, the fore and mid pair lightly and briefly shaded with brown beyond base, the hind pair heavily darkened with blackish brown in all of basal half excepting constricted extreme base; antennae brown in first two segments, remaining segments much lighter, with basal half or third yellow; all major setae pale yellowish. Length about 1.3 mm. (distended, 1.5). Head 202, across eyes 147, behind eyes 127, across cheeks 149, near base 131, its outline much as figured for *hylaeus,* but more deeply incised behind eyes; eyes 64, width 45, interval 58; po. 35, interval 111, 30 from eyes, slightly and roundly dilated at tip; occ. 37, 43 apart, 33 behind eyes, similar to po. Prothorax 91, across coxae 238, reticulate throughout, somewhat asperate laterally and posteriorly, the median reticles in anterior half narrow and longitudinal (as on head); am. wanting, others curved, dilated and rounded at tip, and arising from tubercles, aa. 22, ml. 28, ep. 55, pm. 29, ex. 13; mesothorax 244 across anterior angles, metathorax 256; fore wings 703. Abdomen 259 (at segment III); tube 149, base 60, apex 31, terminal setae 106; segment IX, seta I 84, II 61, III 136; glandular area on VIII occupying all of sternum except margins. Antennal segments: I 36(31), II 50(30), III 67(26), IV 62(26), V 62(23), VI 46(21), VII 33(18), VIII 34(11); III and IV each with 5 knobbed setae.

BRAZIL: Belém, Pará, August 11, 1951, J. D. H., 1 ♂ (holotype), from dead leaves of *Euterpe oleracea.*

Orthothrips pachyura, sp. nov.

Like *hylaeus* and its allies in the disposition of the antennal sense-cones and the relatively long seta I on abdominal segment IX; but tube heavy, with longitudinal ridges in basal two-thirds, not reticulate, not constricted at tip, its sides convex.

♀ (brachypterous): Color brownish yellow, somewhat darker along sides of head and in thorax; abdomen with two linear pale streaks ex-

[5]All measurements are of a KOH-treated paratype.

tending from base of second segment to apex of eighth and marking abdomen roughly into thirds, the median third and the median tergite of tergum I more or less shaded with gray; tube slightly darker than preceding segment and gray in apical seventh; legs and first two segments of antennae about concolorous with body, II darker than I, III-VI yellow in pedicels, III slightly shaded beyond, remainder of IV-VI successively darker, VII and VIII blackish brown and concolorous with apical portion of VI; scattered internal pigmentation red; setae pale yellowish. Length about 1.7 mm. (distended, 1.9). Head 245, across eyes 163, just behind eyes 141, cheeks 164, base 146, basal collar 149, its form and sculpture much as figured for *hylaeus*, but more incised behind the much smaller eyes; eyes 50, 40 wide, 83 apart; po. 24, 141 apart, 25 from eyes, slightly and roundly dilated at tip; occ. 19, 126 apart, 56 behind eyes, similar to po. Prothorax 101, 288 across coxae, surface rather lightly reticulate, am. wanting, aa. 24, ml. 19 and only 15 from aa., ep. 47, pm. 18, all stout, dilated roundly at tip, and arising from tubercles; mesothorax 308 across anterior angles, metathorax 322. Abdomen 385 (at segments II and III); tube 207, base 92, apex 36, terminal setae 117; segment IX, seta I (possibly broken) 124, II 174, III 163. Antennal segments: I 44(40), II 54(36), III 64(31), IV 57(30), V 62(27), VI 53(25), VII 42(20), VIII 43(14); III and IV each with 5 knobbed setae.

BRAZIL: Nova Teutonia, S. C., Aug. 1952, Fritz Plaumann, 1 ♀ (holotype).

Orthothrips exilis, sp. nov.

Like *leptura* in having one sense-cone on outer and one on inner surface of third antennal segment and in the long, slender tube; but with two sense-cones on either surface of the fourth antennal segment, tube shorter in relation to head, and with posterior pair of wing-retaining setae on segments III-VII of abdomen dark, broadened, and flattened.

♂ (macropterous): Color brownish yellow, darkened along sides of head and thorax, abdomen paling to yellow in segments VII and VIII; IX and X abruptly blackish brown, II-V obscurely shaded with brown anteriorly and posteriorly along median line; legs paler than body, with tarsi, trochanters, both ends of tibiae, and apices of femora, yellow; antennae brown in segments I, II, IV, and V, somewhat darker in VI-VIII, III palest and yellow in pedicel, IV fading to yellow at extreme base. Length about 1.4 mm. (distended, 1.6). Head 193, across eyes 130, behind eyes 118, across cheeks 133, near base 123, form and sculpture much as figured for *hylaeus*, but with fewer reticles and more sharply incised behind eyes; eyes 64, 38 wide, 54 apart; po. 10, 104 apart, 22 from eyes, roundly dilated at tip; occ. 8, 51 apart, 42 behind eyes, pointed. Prothorax 93, 232 across coxae, surface reticulate like head, am. 10, slender, and pointed, others stout and dilated, aa. 16, ml. 20, ep. 46, pm. 6, cx. minute, the epimerals arising from large tubercles; mesothorax 242 across anterior angles, metathorax 251; fore wings 624. Abdomen 237 (at segment II); tube 203, very long and slender, base 29, apex 23, terminal setae 71; segment IX, seta I 40, knobbed, II 21, III 130, the last two pointed; glandular area on VIII occupying all of sternum except margins. Antennal segments: I 35(33), II 44(26), III

53(23), IV 57(24), V 56(22), VI 50(20), VII 36(17), VIII 36(13); III and IV each with two knobbed setae.

BRAZIL: Belém, Pará, Aug. 11, 1951, J.D.H., 1 ♂ (holotype), from dead leaves of *Euterpe oleracea*.

Pedoeothrips, gen. nov.
(πεδοι, on the ground)

Allied to *Glyptothrips* and *Chamaeothrips*, but with large antero-marginal setae. Head longer than wide, deeply notched and toothed behind eyes, markedly elevated across middle, scarcely produced between eyes and antennae, strongly polygonally reticulate both dorsally and ventrally, vertex elevated and subconically produced; po. and oc. (as well as most abdominal setae) curved and broadly dilated at tip, genal setae knobbed or blunt. Eyes strongly protruding (in brachypterous individuals, at least, coarsely facetted and much narrower than their interval). Antennae 7-segmented, without trace of suture between the morphological seventh and eighth, III-VII pedicellate, IV-VI subglobose beyond the straight-sided pedicels, II-VI strongly reticulate. Prothorax with all major setae present, am. comparable with the others; clothing setae on legs largely knobbed. Abdomen heavy, broadest behind segment II, its setae not unusually short, those on IX long, I and II dilated at tip; tube normal in form, shorter than head, thickened but not heavily sculptured.

Type species: *Pedoeothrips nigritus*, sp. nov.

Pedoeothrips nigritus, sp. nov.

Readily known by the 7-segmented antennae and the large antero-marginal prothoracic setae.

♀ (brachypterous): Color yellowish brown, heavily shaded along sides of head and pterothorax, nearly black to naked eye; head nearly yellow anteriorly; tube almost black, brown at extreme base and tip; legs concolorous with body except for the yellow trochanters, knees, tips of tibiae, and tarsi; antennae yellowish brown and concolorous with head in segment I, blackish brown or nearly black beyond, pedicel of III yellow basally. Length about 1.2 mm. Head strongly reticulate, total length 178, scarcely produced (only 4) between eyes and antennae, width across eyes 130, across constriction just behind eyes 123; cheeks swollen and rounded at anterior third, thence converging to basal collar, terminating anteriorly in a recognizable flat tooth, greatest width across cheeks 144, in front of basal collar 118, across collar 123; ocelli wanting; po. and occ. colorless, strongly curved and dilated apically, each 33, the former 113 apart and 24 from eyes, the latter 75 apart and 34 behind eyes; poc., ioc., and genals colorless, bent, and usually knobbed; eyes strongly protruding, length 40, width 37, interval 57. Prothorax 99, across coxae 238, pronotum roughened by indistinct reticulation which is more evident anteriorly, all major setae present, nearly colorless, formed like po., ep. 46, pm. 38, ex. 15, others 23-32; mesothorax, across anterior angles 231; metathorax, greatest width 218. Abdomen (at segment IV) 318; tube shorter than head, with thickened wall, roundly narrowed to base, straight and tapering beyond, length 139, width at base 64, at tip 26, terminal setae 71; I-III on IX 116, I and II dilated apically. An-

tennal segments: I 40(34), II 47(33), III 50(30), IV 45(33), V 46(29), VI 44(26), VII 71(22); sense-cones slender, III 1 (1; both small), IV 2(2), V and VI 1(1), VII 1 dorsal; setae on I-V largely knobbed.

Male very similar to female; sternum VIII with glandular area small and nearly circular.

BRAZIL: Nova Teutonia, S. C., Aug., 1952, Fritz Plaumann, 24 ♀ ♀, 5 ♂ ♂ (holotype, ♀; allotype, ♂).

Chamaeothrips, gen. nov.
(χαμαι, on the ground)

Allied to *Glyptothrips* and *Pedoeothrips*, but without major setae on head and prothorax, and with fore tarsi not toothed in either sex. Body flattened; entire dorsal surface polygonally reticulate; ventral surface, legs, and most of antennae similarly reticulate. Head much longer than wide, deeply notched behind eyes, somewhat constricted both dorsally and laterally along hind margin, somewhat produced between eyes and antennae; vertex subconical, bearing the forwardly-directed median ocellus at its extremity; postocular and other cephalic setae very minute. Eyes strongly protruding, much narrower than their interval. Antennae 7-segmented, without trace of suture between the morphological seventh and eighth, segments III-VII pedicellate. Mouth-cone much shorter than its basal width; labrum not attaining tip of broadly-rounded labium; palpi very short. Pterothorax as long as greatest width, which is only slightly greater than that of prothorax across coxae; fore wings curved forward apically, with a median vein extending to middle, without accessory setae; hind wing with vein extending well beyond middle. Abdomen broadest in segment II, its setae unusually short, dully pointed, those on IX shorter than basal width of tube; tube very slender, much longer than head, reticulate in large part like rest of body.

Type species: *Chamaeothrips jucundus*, sp. nov.

Chamaeothrips jucundus, sp. nov.

Closely resembling some of the species of *Orthothrips*, but differing in the number of antennal segments.

♀ (macropterous): Color brownish yellow throughout, including legs, the sides of head and thorax darker, antennae clear yellow in segments III-VI; wings pale brownish gray, veins darker, the fore pair slightly darker in apical half and along fore margin before middle, hind pair darker in posterior half beyond middle. Length about 2.4 mm.; dorsal surface heavily reticulate (much as in *Heliothrips*), except along posterior margins of abdominal terga and sterna and in apical third of tube. Head, total length 279, somewhat produced (19) between eyes and antennae, width across eyes 190, across constriction just behind eyes 172; cheeks straight and nearly parallel in anterior two-thirds, strongly narrowed basally, greatest width across them 188, width at base 158; po. and other cephalic setae minute, dully pointed, about 7; eyes 81, width 50, interval 90. Prothorax 144, across 343, all setae minute (7) and dully pointed; mesothorax, across anterior angles 344; metathorax, greatest width 388; fore wings 1.12 mm. Abdomen (at segment II) 407; tube very long and slender, 402, width at base 83, at tip 36, terminal setae 80; I on IX 37, II 41, III 50. Antennal segments: I 65

(47), II 67(37), III 93(33), IV 91(33), V 82(29), VI 66(26), VII 87(20); sense-cones slender, III 1(2), IV 2(2), V and VI 1(1+1), VII 1 dorsal.

Male extremely like female; sternum VIII with transverse, highly refractive glandular area just behind middle, narrowed or interrupted at middle.

BRAZIL: Nova Teutonia, S. C., Aug.-Nov., 1952, Fritz Plaumann, 8 ♀♀, 4 ♂♂ (holotype, ♀; allotype, ♂).

Pygothrips magnicauda, sp. nov.

Like *longiceps* and *callipygus* in long head and short postocellar setae, but with the tube opaque coal-black and only 1.1 times as long as wide, the head nearly 1.6 times as long as greatest width (which is at base), the cheeks straight and converging anteriorly, and the median pair of setae on abdominal terga II-VI large and about equal to the first pair lateral of them.

♂ (apterous): Color yellowish brown, abdomen shaded with gray behind subbasal lines of terga III-IX, the shading becoming black in VIII and IX, tube completely opaque coal black, scattered internal pigmentation red; tarsi, trochanters, apices of femora, and extreme bases of tibiae yellow, remainder of legs gray-brown, mid and hind tibiae darkest; antennae with segments I and II pale yellow, I lightly shaded basally with brown, IV-VIII blackish brown, III golden yellow, darker than I and II, shaded with gray apically. Length about 1.4 mm. (distended, 1.7). Head 267, across eyes 137, at base 168, the deeply re-entrant angle of cheeks leaving only two eye-facets facing forward, the width across cheeks at eyes just equal to width across latter; eyes 56, about 34 wide and 70 apart; po. 85, pointed, 118 apart, 30 behind eyes, other cephalic setae minute; mouth-cone 129, broad, semi-circularly rounded. Prothorax 140, 392 across coxae, smooth, without median apodeme; am. 66, aa. 50, ml. 65, ep. 92, pm. 79, cx. 66, all pointed; mesothorax 350 across anterior angles, metathorax 357 posteriorly. Abdomen 353 (at segment IV); tube 210, at base 178, shortly beyond base 186, at apex 37, sides evenly rounded to constricted tip, and with strong teeth, each tooth bearing on posterior edge a single short stout seta; segment IX with the three usual setae yellowish basally and nearly colorless apically, each about 294. Antennal segments: I 43(36), II 57(32), III 62(34), IV 53(36), V 50(34), VI 46(30), VII + VIII 64(26), the last two with separating suture on ventral surface, only; sense-cones long, pointed, apically very slender, III and V each with one, and IV with two, on either surface, VI with one on inner surface, VII with one on dorsum.

BRAZIL: Belém, Pará, July 28, 1951, J.D.H., 1♀ (holotype), from dead branch of *Hevea*.

Hoplandrothrips brasiliensis, sp. nov.

Allied to *armiger* through having only one sense-cone on inner surface of third antennal segment, the terminal setae exceeding tube in length, the metanotum reticulate throughout, the pronotum nearly smooth, and segment III of antennae yellow; but larger and with head and antennae longer and slenderer.

♀ (macropterous): Color blackish brown, with head, thorax, and basal abdominal segments often darkened at sides and segments V-VIII of

abdomen usually darker throughout; femora concolorous with body, tibiae yellow at either end, brown or blackish brown between, tarsi yellow; fore wings pale, with anal area dark and a brownish cloud in second fourth; antennae concolorous with head in segments I and II, dark gray-brown in VII and VIII, intermediate segments successively darker, III yellow except for an apical cloud, IV-VI yellow to first whorl of setae. Length about 2.4 mm. (distended, 3.0). Head 333, somewhat elevated medially in occipital area, reticulate with strong lines laterally, and with four or five pairs of strong setigerous tubercles on outline of cheeks, the latter concave in front of basal collar, rounded to eyes, gently convex between, width across eyes 202, across cheeks at about anterior third 218, near base 185; production in front of eyes about 9, its width 102; eyes 110, 68 wide and 66 apart; po. 77, dark brown, nearly straight, broadened and divided apically, 176 apart and about 29 from eyes; mouth-cone very short, extending 120 beyond dorsal margin of head, last segment of labial palpi about 21. Prothorax 181, across coxae 385, surface with a few striae at sides and posteriorly, smooth elsewhere; all major setae present, colored and formed like po., ep. 92, pm. 81, others (including cx.) 46-65; mesothorax 388 across anterior angles, metathorax 363 posteriorly; fore wings 1020, with 9-13 accessory hairs. Abdomen 428 at segment IV; tergum II with one knobbed seta at each posterior angle, III with two; tube 167, across basal collar 79, just beyond 78, apex 41, sides straight; terminal setae 238; setae I and II on IX slightly widened apically, III pointed, I 120, II 125, III 162. Antennal segments: I 50(49), II 64(35), III 93(42), IV 84(40), V 76(31), VI 66(27), VII 58(23), VIII 43(13); III with inner surface concave at first seta, convex between it and base; VIII narrowed basally and with a slight constriction immediately beyond base; major sense-cones on III 1(2), IV 2(2), V and VI 1(1).

♂, macropterous: Different from ♀ in the usual ways; abdomen sometimes paler in intermediate segments, especially at sides; head 332, across eyes 186, across cheeks 197, near base 167; seta II on abdominal segment IX 61, shorter, darker, and somewhat stouter than I and III.

BRAZIL: Ilha da Gipoia, Angra dos Reis, R. J., May 25, 1948, J. D. H., 2 ♀♀ (including holotype) and 3 ♂♂ (including allotype), from dead branches; Jacarepaguá, D. F., June 24, 1948, J. D. H. and Dr. Thomaz Borgmeier, 1 ♀, from dead hanging leaf of *Dahlia*.

Hoplandrothrips longirostris, sp. nov.

Very similar to *brasiliensis* in color and structure, but larger, with a much longer mouth-cone, longer labial palpi, and less heavily sculptured metanotum.

♀ (macropterous): Color blackish brown, with head, thorax, and basal abdominal segments often darkened at sides and segments V-VIII of abdomen usually darker throughout; femora concolorous with body; tibiae bright yellow throughout or yellow at either end and brown or blackish brown between, the middle and hind pairs always darker than fore pair, which is usually clear yellow; tarsi yellow; fore wings pale, with anal area dark and a brownish cloud in second fourth; antennae concolorous with head in segments I and II, dark gray-brown in VII and VIII, intermediate segments successively darker, III yellow except for an apical cloud, IV-VI yellow to or beyond first whorl of setae.

Length about 2.6 mm. (distended, 3.3). Head 354, distinctly elevated medially in its basal half, reticulate with strong dark lines laterally, and with four or five pairs of setigerous tubercles on outline of cheeks, the latter concave in front of basal collar, rounded to eyes, gently convex between, width across eyes 221, across cheeks at about anterior third 235, near base 196; production in front of eyes about 7, its width 136; eyes 117, width 80, interval 61; po. 105, dark brown, nearly straight, broadened and divided apically, 193 apart and about 35 from eyes; mouth-cone long, extending 238 beyond dorsal margin of head, last segment of labial palpi about 30. Prothorax 186, across coxae 434, surface with a few striae at sides and posteriorly, smooth elsewhere; all major setae present, colored and formed like po., aa. 78, ep. 108, pm. 101, others (including cx.) 48-51; mesothorax 448 across anterior angles, metathorax 421 posteriorly; fore wings 1260, with 13-18 accessory hairs. Abdomen 497 at segment II; tergum II with one knobbed seta at each posterior angle, III with two; tube 182, across basal collar 87, just beyond 85, apex 46, sides straight; terminal setae 281; setae I and II on IX slightly widened apically, III pointed, I 148, II 157, III 198. Antennal segments: I 53(49), II 74(36), III 113(44), IV 103(43), V 83(34), VI 74(28), VII 60(26), VIII 47(16); III with inner surface concave at first seta, convex between it and base; VIII narrowed basally and with a slight constriction immediately beyond base; major sense-conse on III 1(2), IV 2(2), V and VI 1(1).

BRAZIL: Petrópolis, R. J., May 11 (1 ♀, paratype), and June 27 (1 ♀, holotype); Boracéa, Munic. de Salesópolis, S. P., June 5-8 (8 ♀♀, paratypes); and São Carlos, S. P., June 13 (3 ♀♀, paratypes). All specimens were taken by the writer, in 1948, from dead branches.

Macrophthalmothrips allops, sp. nov.

From the species most closely allied to the type of the genus, all of which, too, have the middle and hind femora blackish brown with yellow tips and the hind tibiae yellow at base and apex, this species is readily known by the following characters: Ocellar region (when head is horizontal) with its anterior margin distinctly behind that of front of eyes, the latter covering only the pedicel of second antennal segment; eyes of male scarcely attaining tip of frontal costa, their ventral length just one-half width across eyes, this anterior portion of eyes forming an almost perfect semicircle when seen from above; segment IV of antennae with one major sense-cone on outer surface; brachyptrous ♂ with a short, curved, thumb-like tooth at extreme base of inner ventral surface of fore femora, this tooth (doubtless heterogonic) wanting in macropterous ♂.

♂, forma macroptera: Color not markedly different from that of type of genus and its allies, with the usual white vitta along sides of head and thorax broken into spots on abdomen, and with scattered red internal pigmentation; abdomen darkest in segments I-IV, paling to yellow in VIII and most of IX, V-VII obscurely shaded with gray excepting at sides, IX shaded across apical third or fourth, tube brownish yellow in basal third, shaded beyond; legs largely brown, with tips of femora and both ends of all tibiae yellow, middle and hind tibiae darkest, tarsi light brown; fore wings gray-brown, with dark vein, paler basally, the fore pair nearly colorless in distal end of anal area, in the region of the third subbasal seta, and to the first two such setae; antennae dark gray-

brown in segments I, VII, and VIII, II paler but darkened basally and laterally, III pale yellow but shaded in about apical half, especially on outer surface, IV-VI with basal half or third yellow, shading to dark gray-brown beyond. Length about 1.3 mm. (distended, 1.6). Head 220, 146 across eyes, across cheeks 152, near base 148; eyes 130; po. 27, 45 apart, 16 from eyes, tips dilated; mouth cone extending 153 beyond dorsum of head; prothorax 110, across coxae 284, setae pale and dilated, ep. 50, pm. 40, coxals and others 24-30; mesothorax 239 across anterior angles, metathorax 238 posteriorly; fore wings 588; abdomen (at segment II) 214; tube 101, base 59, apex 29, terminal setae 112; setae on IX yellow, pointed, I 96, II 105, III 120; antennal segments: II 44(30), III 54(23), IV 53(24), V 50(21), VI 51(20), VII+VIII 69(19), maximum length of VII 49, of VIII 27, width of last 11; III-VI each with 1(1) major sense-cones, VII with the usual dorsal one.

♂, forma brachyptera: Like macropterous form excepting for the stout fore femora and tibiae and the thumb-like tooth arising from the ventral surface of the femora close to base.

BRAZIL: Belém, Pará, July 24 (1 macropterous ♂, 2 brachypterous ♂ ♂, one of latter the morphotype) and 25 (1 macropterous ♂, the holotype), 1951, J. D. H., from dead branches, including some of *Hevea*.

Plectrothrips thoracicus, sp. nov.

Thoroughly typical, but differing from all other species known to me by the following characters: (1) mesosternum with anterior margin rather deeply emarginate, lightly sclerotized and little differentiated from the membrane in front, never with a complete margining sclerite; (2) spinisternum of prothorax much broader than mouth-cone; (3) median ocellus not flanked by a pair of minute setae, its posterior margin much in advance of anterior margin of eyes; (4) occipital line wanting; (5) second antennal segment, exclusive of pedicel, globose, its apex and sides forming an even curve; (6) median tergite of first abdominal tergum nearly triangular; (7) second abdominal tergum with the pair of pores anterior to and mediad of the minute setae; (8) terminal setae much shorter than tube.

♀, macropterous form: General color gray-brown with a yellowish cast, legs yellow but narrowly shaded with gray on morphologically upper surfaces of femora; antennae brown, with segment II and pedicel of III yellow. Length about 1.6 mm. (distended, 1.8); dorsal surface smooth and shining, without sculpture except for a few faint longitudinal striae near angles of metanotum, two or three of them extending beyond the metanotal setae. Head 193(225), across eyes 182(185), just behind eyes 181, across cheeks 182, at base 154; eyes 77(89), width 38(44), interval 82(97); po. 24, 159 apart, 26 from eyes. Prothorax 154, across coxae 293, ep. 29, cx. 38, other setae minute; mesothorax 259 across anterior angles, metathorax 281 posteriorly. Abdomen 281 (at segment IV); tube 117, base 62, apex 29, terminal setae 80; seta I on IX 69, II 46, III 103. Antennal segments: I (41(46), II 57(39), III 51(40), IV 51(41), V 50(38), VI 47(28), VII 47(24), VIII 52(14); sense-cones normal in form and arrangement, IV with two on outer surface, VI with rudimentary cone, only, on outer surface.

♀, brachypterous form: Color brownish yellow shaded with gray in head, thorax, and in abdominal segments I-IV, tube brown, legs yellow,

antennae brownish yellow, shaded with gray in I and V-VIII. Thorax and abdomen heavier than in macropterous form, eyes smaller and flattened, tarsal tooth longer than width of tarsus. Head 218, across eyes 175, behind eyes 172, across cheeks 186, at base 168; eyes 64, width 30, interval 116; po. 40, interval 168, 37 from eyes. Prothorax 195, across coxae 349, ep. 53, cx. 55; mesothorax 280 across anterior angles, metathorax 286 posteriorly. Abdomen 354 (segment IV); tube 140, across base 71, apex 33, terminal setae 97; seta I on IX 104, II 56, III 106.

BRAZIL: Belém, Pará, July 23 (1 ♀, morphotype), 29 (1 ♀), Aug. 2 (2 ♀♀, including holotype), J. D. H., the specimen taken July 29 from *Bixa*, the three others from *Hevea*.

Plectrothrips glaber, sp. nov.

Thoroughly typical, with terminal setae longer than tube and subbasal line of tergum II of abdomen represented only by a short dash near lateral margins, but without longitudinal striae between and behind the two major setae, the latter longer than usual (50μ), tube long (182μ, across basal collar 89), occipital line not well differentiated, broadly interrupted at middle; pores on abdominal tergum II mediad of the two minute setae.

♀ (macropterous): Color brown, darkest in head, thorax, and tube, the last reddish brown, rather than blackish; legs brownish yellow, femora darker and shaded on the morphologically upper surface; antennae dark brown in segment I, which is concolorous with head, remainder yellowish brown, III palest and yellow basally. Length about 1.8 mm. (distended, 2.3), dorsal surface nearly free of sculpture, metanotum with a few faint striae at sides of basal half, only. Head 221, across eyes 178, behind eyes 174, across cheeks 178, at base 144; eyes 87, width about 41, interval immediately behind ocelli 96; po. 58, 158 apart, 40 from eyes. Prothorax 172, across coxae 353, ep. 99, cx. 69, others minute; mesothorax 302 across anterior angles, metathorax 323 posteriorly; fore wings 966. Abdomen 398 (at segment IV); tube 182, 89 across basal collar, 84 subbasally, 41 at apex, terminal setae 266; seta I on IX 132, II 81, III 230. Antennal segments: I 49(46), II 63(37), III 55(40), IV 61(42), V 58(34), VI 60(30), VII 57(23), VIII 63(15); sense-cones as in type of genus.

BRAZIL: Nova Teutonia, S. C., Dec., 1951, Fritz Plaumann, 1 ♀ (holotype), from dead branches.

Myopothrips, gen nov.
(*μύοψ*, spur; *θρίψ*)

Closest to *Plectrothrips*, but with pronotum as broad between epimera as at middle, its posterior margin not thickened laterally; fore tibiae very short, about equal in length to fore tarsi, the latter with outer surface prolonged tooth-like beyond tip of tarsus proper, tarsal tooth equally prolonged; first antennal segment much longer than any of the others, its inner surface prolonged, tip with a ventral tooth at middle; antennal segments III-V fully as broad as long, each with one stout blunt sense-cone on either surface; fore wings without accessory hairs.

Type species: ***Myopothrips amazonicus***, sp. nov.

Myopothrips amazonicus, sp. nov.

General appearance that of a small *Plectrothrips*. General color brown with a yellowish cast, all tibiae and tarsi and inner surface of fore femora nearly yellow, middle and hind femora shaded with brown; antennae about concolorous with body, segment II brownish yellow and palest; wings nearly uniform yellowish brown.

♀ (macropterous): Length about 1.2 mm. (distended, 1.4); dorsal surface smooth and shining, without sculpture except for a few faint longitudinal striae across base of metanotum and along its median line. Head 182, across eyes 140, across cheeks 151, at base 118, formed as illustrated for *Plectrothrips*, with ocelli similarly placed; po. 42, 138 apart, 34 behind eyes; mouth-cone small, only 73 long and 61 wide. Prothorax 155, across coxae 287, ep. 52, ex. 48, others minute (10-16) and slender; mesothorax 220 across anterior angles, metathorax 230 in posterior part, fore wings 588. Abdomen 224 (at segment IV); tube 76, base 43, apex 24, sides somewhat thickened, form as illustrated for *P. pallipes;* terminal setae 170; segment IX, seta I 42, II 30, III 83. Antennal segments: I 58(35), II 48(31) and arising from outer apical portion of I, III 34(35), IV 33(36), V 33(33), VI 35(26), VII 37(21), VIII 43(14), III-V each with one stout sense-cone on either surface, VI with one on inner and VII with one on outer surface.

BRAZIL: Belém, Pará, July 27, 1951, J. D. H., 1 ♀ (holotype), from dead branches.

Epomisothrips, gen nov.

(επωμίς, the point of the shoulder; θρίψ)

Haplothrips group. Head broadened behind eyes and strongly narrowed to well-developed basal collar, poc. strong, close together, and heavier than po.; eyes finely facetted, well separated, nearly as long ventrally as dorsally; vertex rounded, median ocellus directed forward and about attaining front margin of eyes; mouth-cone broadly rounded, tip of labrum not nearly attaining tip of labium; antennae 8-segmented, all setae small and inconspicuous. Prothorax not abbreviated, dorsal sclerites separate, setae short, am. minute. Fore tarsi armed in both sexes; fore legs of male much as in *Hoplandrothrips*, with ventral apical femoral tooth, ventrally recessed base of tibiae, and strongly toothed tarsi, but with inner surface of tip of fore tibiae prolonged into a tooth above which is a transverse thickening. Mesothorax with anterior angles prolonged laterally, metathorax much narrower. Fore wings somewhat narrowed at middle, with a few accessory setae; subbasal setae very short, the first and third minute. Tube normal. Male without ventral glandular areas.

Type species: *Epomisothrips araucariae*, sp. nov.

Epomisothrips araucariae, sp. nov.

♀ (macropterous): Color nearly black, with fore tarsi yellowish; antennae concolorous with body in segments I, II, VII, and VIII, the intermediate segments successively darker, III yellow and clouded apically, IV yellow in about basal half, V yellow in basal third, VI paler basally; fore wings pale yellowish brown, with a more-or-less evident dark streak in about middle third. Length about 2.1 mm. (distended,

2.6). Head 284, lightly reticulate, faintly so medially and between po., the reticles stronger and sloping backward in posterior half of head, width across eyes 238, behind them 269, in front of basal collar 193; eyes 89, 67 wide, 104 apart; po. short (56), straight, dark, pointed, 189 apart, 21 from eyes; oc. minute, about 75 apart and 46 behind po.; poc. 33, thorn-like, stouter than po. or occ. (diameter about 4), somewhat closer together than posterior ocelli and arising about 6 behind these; mouth-cone extending about 136 beyond posterior dorsal margin of head. Prothorax 189, across coxae 405, surface faintly reticulate almost throughout; am. minute, others formed and colored like po., aa. 34, ml. 16, ep. 67, pm. 48, a variable number on coxae 9-20; all femora with a number of minute, stout, thorn-like setae dorsally; fore tarsi with a small triangular tooth at middle of first segment; mesothorax 430 across the prominent anterior angles, posteriorly only 392; metathorax 388 posteriorly; fore wings 1020, with about 5 accessory setae, middle subbasal seta 32, pointed, others minute. Abdomen 433 at segment IV, median tergite of tergum I polygonally reticulate, rest of abdomen (both dorsally and ventrally) finely cross-striate with anastomosing lines; tube 143, across basal collar 77, subbasal width 73, apical width 39, sides straight beyond slightly concave basal third; terminal setae 163; segment IX with setae pointed, I 110, II 118, III 104. Antennal segments: I 43(41), II 60(34), III 69(27), IV 63(31), V 63(29), VI 56(26), VII 53(23), VIII 40(14), this last slightly narrowed at base but not pedicellate; sense-cones short, almost indistinguishable from setae on III, this with one on outer surface, IV-VI with major sense-cones 1(1).

♂ (macropterous): Like ♀ in color and most details of structure, but with po. and aa. knobbed and longer (po. 60, aa. 46), and fore legs as described under the genus.

BRAZIL: Curitiba, Paraná, A. Carvalho, 12 ♀♀ (including holotype) and 4 ♂♂ (including allotype), from leaves of *Araucaria brasiliensis*. This material was received from Dr. A. da Costa Lima.

Holcothrips, gen nov.
(ὅλκος, attractive; θρίψ)

Liothrips group. Body broad and heavy, with short abdominal segments which are somewhat longer ventrally; upper surface of head, thorax, femora and tibiae finely reticulate. Head quadrate, with parallel cheeks, very short postoculars, and large ocelli; eyes much longer dorsally than ventrally; ocelli large and close together; mouth-cone heavy, broadly rounded, tip of labrum not nearly attaining tip of labium; antennae 8-segmented, segments V and VI both longer than either III or IV, VIII conical, slender, all setae small and inconspicuous. Prothoracic epimera and episterna fused with notum; two pairs of large epimeral setae; antero-marginals small, antero-angulars large, all knobbed, divided at tip, and arising from slight eminences. Fore tarsi unarmed in both sexes. Wings broad, not narrowed at middle, without accessory setae. Tube nearly equal in length to head, simple, nearly straight.

Type species: *Holcothrips achmaeae*, sp. nov.

Holcothrips achmaeae, sp. nov.

♀ (macropterous): Color deep brown, with red internal pigmentation, brown setae, and bright pale yellow tube which is narrowly dark brown

at base and tipped with gray; head with front and a ring about eyes yellow; legs concolorous with body, except for the yellow tarsi and the yelowish tips of femora and tibiae; fore wings light brown, darker in anal area and basally, pale in middle third; antennae brown in the first two and last two segments, the intermediate ones yellow. Length about 2.1 mm. (distended, 2.6). Head 281, finely reticulate above and with minutely serrate parallel cheeks, width across eyes 239, across cheeks 248, at base 239; eyes 120, width 79, interval 82, ventrally only 75 long; ocelli large (median 37), reticulated ocellar area slightly elevated, median ocellus not quite attaining front margin of eyes and about 23 from posterior ocelli, which are 22-27 apart; po. minute (25) and pointed, 151 apart and 18 from eyes; occ. and poc. like po., the former 71 apart and about 13 behind po.; mouth-cone extending 126 beyond posterior dorsal margin of head. Prothorax 147, across coxae 317; am. 39, knobbed or pointed, others straight, dilated and divided at tip, aa. 66, ml. 50, outer ep. 108, inner ep. 83, pm. 55, ex. 28; mesothorax 477 across anterior angles; metathorax 532 across bulging middle; fore wings 1010. Abdomen 551 across segment IV; tube 270, across basal collar 104, subbasally 100, at tip 57, sides slightly convex; terminal setae 170; setae on IX straight, all knobbed, I 185, II 203, III 157. Antennal segments: I 43(50), II 63(37), III 73(30), IV 69(31), V 84(30), VI 77(27), VII 67(25), VIII 46(13).

♂ (brachypterous): Almost identical with ♀ in color and structure, fore tarsi not toothed, abdominal sterna without glandular areas.

BRAZIL: Rio de Janeiro, D. F., June 10, 1948, E. R. de Figueiredo, Jr., 7 ♀♀ (including holotype and 2 ♂♂ (including allotype), from leaves of *Achmaea* sp.

Homorothrips, gen nov.

(Ὅμορος, neighboring; θρίψ)

Closely allied to *Liothrips*, but with ml. close to aa. Head much longer than wide and longer than prothorax, very slightly produced between eyes and antennae, lightly transversely striate, the cheeks thus smooth; eyes much longer and wider dorsally than ventrally, finely facetted, without re-entrant angle; vertex not produced, median ocellus not overhanging; mouth-cone short, rounded, tip of labrum not attaining that of labium; antennae normal, 8-segmented, the last segment subconical, slightly narrowed at base, III and IV with major sense-cones 1(2), V and VI 1(1). Prothorax normal, surface smooth, all major setae present, blunt at tip, ml. arising almost directly behind aa. and relatively close to them; legs slender, fore tarsi unarmed in both sexes. Wings not narrowed at middle, with accessory setae on posterior margin. Abdomen normal, setae long and mostly pointed; tube shorter than head, with straight sides.

Type species: *Homorothrips erianthi*, sp. nov.

Homorothrips erianthi, sp. nov.

♀ (macropterous): Color dark blackish brown (nearly black), with red internal pigmentation; legs about concolorous with body, but with knees and trochanters slightly paler, the tarsi, tips of fore femora, and the fore tibiae yellow or nearly so, the fore tibiae shaded dorsally with brown, except at ends; fore wings light brown, darkened in anal area

and basally, with a median dark streak in about second fourth, paler apically, but edged posteriorly with darker; antennae about concolorous with body in segments I, II, VII, and VIII, apex of II yellow, III-VI largely pale yellow, successively darker, III and IV lightly clouded apically, V and VI darkened in about apical half and two-thirds, respectively. Length about 2.3 mm. (distended, 2.9). Head 297, across eyes 211, across cheeks 221, near base 196, cheeks slightly convex; eyes 123, width 70, internal 72; po. 84, straight, either pointed or open at tip, 119 apart and about 25 from eyes; mouth-cone extending about 121 beyond posterior dorsal margin of head. Prothorax 196, across coxae 402, smooth except for a few faint striae at sides, on epimera, and along posterior margin; major setae all present, dark brown, open at point, am. 44, aa. 53, ml. 80, ep. 115, pm. 110, cx. 65, ml. about 23 behind aa.; mesothorax 392 across anterior angles, metathorax 426 posteriorly, metanotum very closely longitudinally striate with fine black lines except at sides posteriorly, the striated area thus triangular; fore wings with about 11 accessory setae. Abdomen 491 at segment IV; median tergite of tergum I triangular, reticulate, with a pair of pores; tube 199, subbasal width 88, apex 48, smooth, sides straight; terminal setae 224; segment IX with setae pointed or nearly so, I 160, II 146, III 131. Antennal segments: I 46(50), II 61(33), III 87(36), IV 74(34), V 73(30), VI 70(25), VII 60(22), VIII 36(11); major sense-cones on III and IV 1(2), on V and VI 1(1).

♂ (macropterous): Like ♀ in color and structure; ml. similarly placed; fore tarsi unarmed; abdominal sterna VI-VIII each with a pair of narrow glandular areas extending along anterior margin at sides, lying in lateral third or fourth of terga, VIII with a similar narrow area (sometimes broken) traversing posterior third; seta II on IX not shortened.

BRAZIL: Piracicaba, S. P., August 3, 1950, D. P. de Souza Dias, 19 ♀♀ (including holotype) and 6 ♂♂ (including allotype), from a grass (*Erianthus asper*).

Anoplothrips, gen. nov.

ἄνοπλος, unarmed; θρίψ)

Allied to *Eothrips* and *Tetradothrips* (*Liothrips* group). Body relatively short and stout, with somewhat short legs (especially the fore pair), short abdominal segments whose basal sterna are longer than terga, and slightly knobbed or blunt setae with open ends. Head longer than broad, scarcely prolonged between eyes and antennae, rounded and nearly vertical in front, with median ocellus arising a trifle in advance of anterior margin of eyes and directed forward; eyes slightly protruding, finely facetted, a trifle longer and wider dorsally than ventrally; mouth-cone short, broadly rounded, tip of labrum not attaining tip of labium; po. arising close to eyes; antennae 8-segmented, rather stout, with segment IV shorter than II, III, V, VI, and VII, segment VIII conical and scarcely narrowed at base. Prothorax little shorter than head; am., aa., and ml. short; fore femora somewhat enlarged, fore tibiae and tarsi heavy, all unarmed. Pterothorax normal. Fore wings broad, not narrowed at middle, with accessory setae on posterior margin. Tube normal.

Dr. Priesner says that *Eothrips* is close, but differs in having "femora not enlarged, antero-angular and -marginals well developed, antennae shorter and stouter, segment IV longer than V." *Tetradothrips* lacks accessory wing setae, and the epimeral setae are long, curved, and pointed.

Type species: *Anoplothrips jaboticabae*, sp. nov.

Anoplothrips jaboticabae, sp. nov.

♀ (macropterous): Color light brown; legs nearly concolorous with body, with tarsi, trochanters, fore tibiae, and tips of fore femora yellow, middle and hind knees yellowish; fore wings pale brown, darker basally and in anal area; antennae concolorous with body in segments I, II, VII, and VIII, apex of II yellowish, III pale yellow, very faintly clouded apically, IV-VI successively darker, IV yellowish in basal half, V in basal third, VI obscurely yellow basally. Length about 1.5 mm. (distended, 1.9). Head 202, lightly but not closely reticulo-striate throughout, more distinctly basally and laterally, width across eyes 167, across cheeks 166, near base 151, cheeks nearly straight; eyes 73, 52 wide, 63 apart, slightly protruding; median ocellus 21, forwardly directed, its origin slightly in advance of front margin of eyes; po. 37, pale brown, straight, with blunt open tips, interval 113, distance from eyes 15; mouth-cone extending 117 beyond posterior dorsal margin of head. Prothorax 156, across coxae 305, major setae all present; am. always, aa. and ml. often, reduced in size and pointed, aa. and ml. usually about 24, ep. 59, pm. 43, ex. 27, formed and colored like po.; mesothorax 307 across anterior angles; metathorax 308 posteriorly; metanotum very closely longitudinally striate with fine black lines except at sides posteriorly, the striae flaring outward near rear of the sclerite to form polygons, the sculptured area thus oblong, rather than triangular; fore wings 812, with 7 or 8 accessory setae on posterior margin. Abdomen 339 at segment IV; median tergite of tergum I polygonally, and more or less concentrically, reticulate, with two pores; remainder of dorsal surface largely finely cross-striate; tube 150, subbasal width 77, apical width 44, sides nearly straight; setae on segment IX long, I and II slightly dilated, III pointed, I 113, II 119, III 151. Antennal segments: I 34(40), II 49(32), III 51 (27), IV 44(27), V 52(30), VI 52(27), VII 49(24), VIII 33(13); sense-cones variable, III and IV always with a ventral major one near outer surface, III-VI with one on either lateral surface, though one or more of these may be reduced in size or absent; setae short, pointed, colorless.

BRAZIL: São Carlos, S. P., July 11, 1950, D. P. de Souza Dias, 4 ♀♀ (including holotype), from jaboticaba.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

NEW MEXICAN AND VENEZUELAN MILLIPEDS IN THE COLLECTION OF THE ILLINOIS STATE NATURAL HISTORY SURVEY

By Nell B. Causey
Fayetteville, Arkansas

The millipeds described here are in the permanent collection of the Illinois State Natural History Survey, Urbana, Illionis. I am indebted to Dr. M. W. Sanderson for the opportunity of studying the collection of Mr. W. L. Burger and to Mr. Ottys Sanders for the gift of his collection.

Order SPIROSTREPTOIDEA
Family SPIROSTREPTIDAE

Orthoporus unicus, n. sp.

Figs. 1-3

Near *O. striatus* Pocock 1908 in size, number of segments, and the form of the posterior lamina of the male gonopods; distinguished from that species by the absence of coarse, anastomosing ridges on the tergites and by the sharp, medial angle on the anterior lamina.

Male holotype.—In alcohol the predominating color is light gray brown with confluent dark brown and red brown annuli on the posterior half of the metazonites and the posterior margin of the collum; legs and antennae red brown. Ocelli in 6 curved rows of about 10, 10, 9, 8, 7, 5. Lappets on the ventral margin of the fifth and sixth articles of the third through the seventh legs.

Keels of collum as shown in figure 1. Exposed surfaces of tergites covered with small, anastomosing ridges and punctures in the grooves; only with magnification is the longitudinal direction of the ridges detected. Metazonites striate below pores; approaching the pores the striae are abbreviated, and a few very short striae are continued above the pores. Segmental sulci deep and complete; sulci slightly curved at level of pores, which are located about one-third of the distance from the sulci to the posterior margins. Pores begin on sixth segment. Caudal tergite short, with a slight transverse depression, the apex broadly obtuse, and exceeded by the anal valves. Medial margin of anal valves thick, not closely appressed. Anal tergite and valves finely punctuate. Anal scale with anterior margin widely convex and posterior margin broadly obtuse.

Posterior lamina of gonopods (Fig. 2, *p*) produced laterad into an unusually long, sharp cone. Telopodite (*t*) long, coiled, and without any processes; end expanded (Fig. 3) as usual for the genus, the small seminal spine (*s*) not projecting from the corolla (*c*).

Diameter 4.8 mm., 64 *segments*, 1 legless.

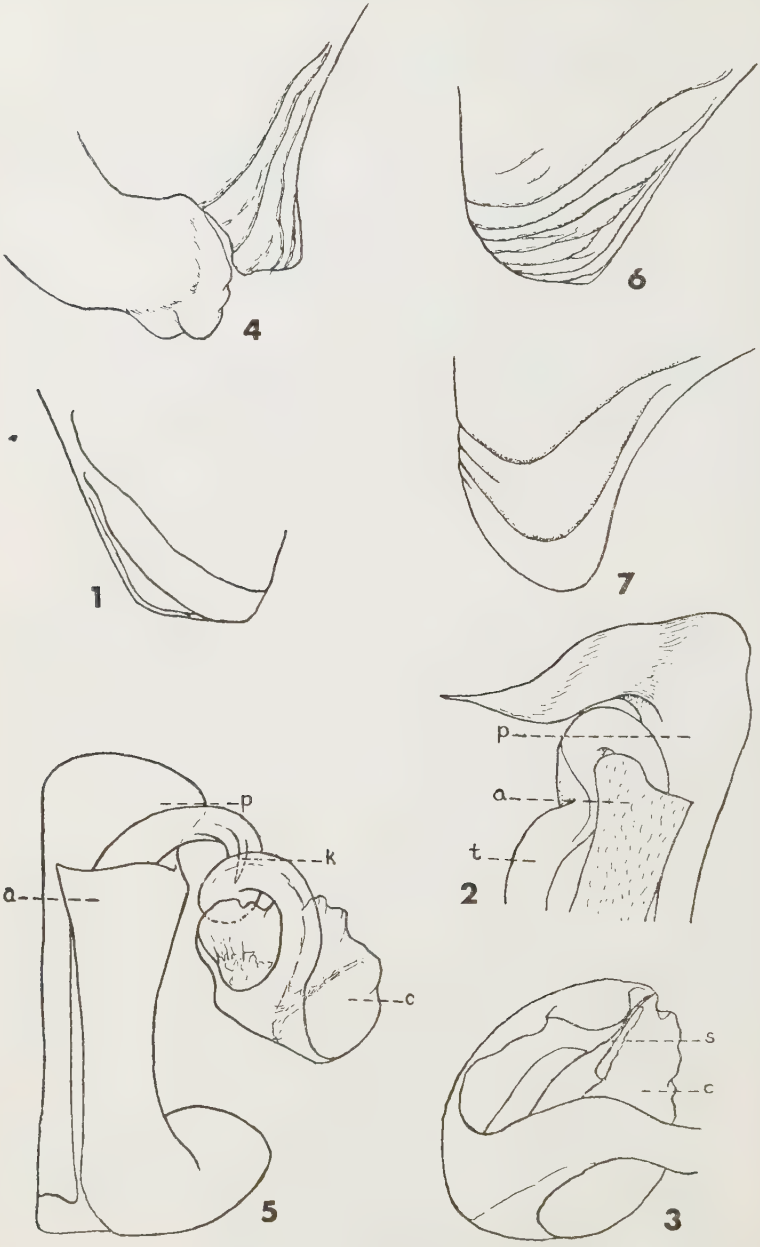


PLATE I

Type locality.—Two miles northwest of Rancho Nuevo, Chiapas, Mexico; Aug. 18, 1949; pine forest, W. L. Burger.

A *female* from the same locality has been tentatively assigned to this species. It differs from the male in being much larger, in having the pores almost in the middle of the metazonite, in having the longitudinal direction of the ridges more pronounced, and in being darker. As usual, the anterior angles of the keels of the collum are more obtuse than in the male. *Diameter* 7.3 mm., 60 *segments*, 1 legless. Another female, *diameter* 6.9 mm., 64 *segments*, was collected 13 miles south of La Trinitaria, Chiapas, Aug. 12, 1949.

Orthoporus spp.

Several undetermined females from 15 miles south of Pichualaco, 13 miles east of Las Rosa, and Ocozocoautla, all in Chiapas, represent at lease three other species.

Genus **CHAMBERLINEPTUS**, new

The gonopods resemble those of *Andineptus* Chamberlin 1941 in the absence of a lateral cone on the posterior lamina and in the presence of a corolla at the apex of the telopodite. Unlike *Andineptus*, there is no seminal spine projecting from the corolla, and there is a short spine at the knee of the telopodite. In the male, the ventral margins of the first three segments are thicker and longer than in related genera. Pores begin on sixth segment. Surface without conspicuous sculpture. Anal tergite shorter than valves.

Genotype.—Chamberlineptus morechalensis, n. sp.

Chamberlineptus morechalensis, n. sp.

Figs. 4-6

Male holotype.—In alcohol the color is brown with red brown annuli on the posterior margin of the metazonites; legs and antennae yellow brown. Head smooth and shining, with the usual sulcus on the vertex. Ocelli in 7 curved rows of about 13, 13, 12, 11, 10, 8, 7. Lappets on the ventral margin of the fifth and sixth articles of the third through the seventh legs.

Keels of collum produced in narrow, quadrate lobes; tergites of second and third segments also produced ventrad (Fig. 4), the second more than the third. Body surface shining, smooth; under magnification small punctures are observed evenly distributed on exposed surfaces. Segmental sulci complete but scarcely more conspicuous than the encircling striae of the prozonites; sulci very slightly curved at level of pores, which are a little nearer the sulci than the posterior margins. Metazonites with the usual horizontal striae below pores, a few very short ones approaching and above pores. Caudal tergite short, with a distinct transverse depression, the surface coriaceous between the depression and the apex, the apex broadly obtuse, and exceeded by the anal valves. Medial margin of anal valves elevated but not closely appressed or much thickened. Anal sternite wide and narrow, with both margins about equally convex.

An anterior view of the right gonopod is shown in figure 5.

Diameter 5.4 mm., *length* about 100 mm., 61 *segments*, 1 legless.

Female paratype. Closely resembles the male except that the shape of the keels of the collum (Fig. 6) is typical of the family and the second

and third tergites are not produced ventrad. *Diameter* 7.2 mm., *length* about 120 mm., 58 *segments.*

Type locality.—Morechal, Territory of Delta-Amacuro, Venezuela; Aug. 6, 1950; W. L. Burger; 1 male; 7 females. The diameter of the females varies from 7.2 to 6.0 mm., in some the inferio-anterior angles of the collum are produced more, in others less, than in the one shown in figure 6.

Genus **VENEZUENEPTUS,** new

The gonopods resemble those of *Ellateptus* Chamberlin 1941 in the elaborate development of the posterior lamalla of the coxite. Unlike *Ellateptus,* there is a slight development of the tarsal region and a short process on the knee of the long, slender telopodite. Pores begin on sixth segment. Surface without conspicuous sculpture. Anal tergite shorter than valves.

Genotype. Venezueneptus liber, n. sp.

This genus also includes *V. geayi* (Brolemann 1898), which has been collected at Haut et Bas Sarare and at El Valle, near Caracas, Venezuela (Chamberlin 1941).

Venezueneptus liber, n. sp.

Figs. 7, 8

Distinguished from *V. geayi by* the absence of a well-marked, narrow, longitudinal, straw colored band on the dorsum. Minute differences in the gonopods between the two species may also be of specific importance.

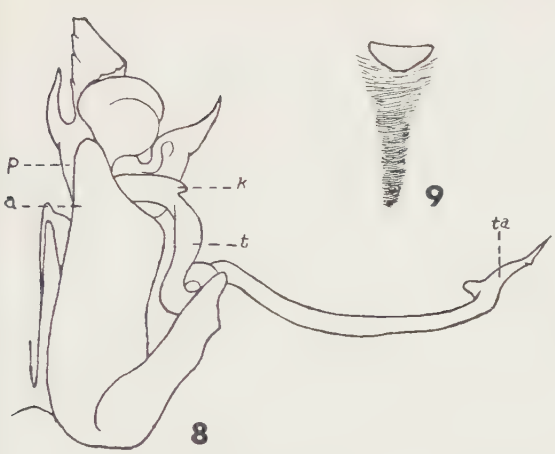
Male holotype.—In alcohol the prozonites are dark brown, the metazonites and margins of the anal valves are dark red brown, and the legs and antennae are light red brown. Head smooth and shining, with the usual sulcus on the vertex. Ocelli in 6 curved rows of about 9, 8, 8, 7, 4, 2. Lappets on the ventral margin of the fifth and sixth articles of the third through the seventh legs.

Keels of collum with two long striae as in *geayi,* but the anterior corner is more broadly rounded than in that species (Fig. 7); second and third tergite not produced ventrad. Body surface smooth, shining; under magnification metazonites and anal tergite finely and sparsely punctuate and rugose; anal valves, except for the smooth raised margins, coriaceous. Segmental sulci deep, complete, beginning on the second segment, and straight at level of pores. Pores about one-third the distance from the sulci to the posterior margins. The usual horizontal striae on the metazonites become very short approaching the pores, and a few are continued above the pores. Apex of caudal tergite obtusely angled, very thin, exceeded above and behind by anal valves. Margins of anal valves high, tightly appressed, moderately thickened. Both anterior and posterior margins of anal scale convex.

Gonopods, as shown in figure 8, strikingly similar to those illustrated by Brolemann for *geayi;* they differ in the minute serration on the margin of the apex of the posterior lamella, in the short, very blunt process on the knee of the telopodite, and the minute apical tooth on the tarsus of the telopodite. All of these characters might have been regarded by Brolemann as too small to be included in his figure.

Diameter 2.5 mm., *length* about 43 mm., 52 *segments,* 1 legless.

Female paratype. Closely resembles the male except that the shape of



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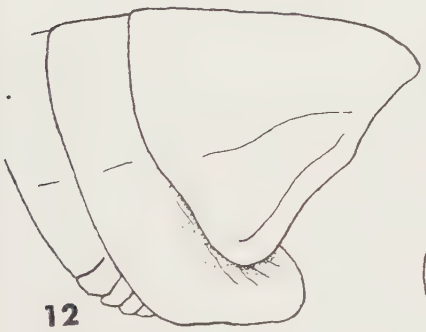

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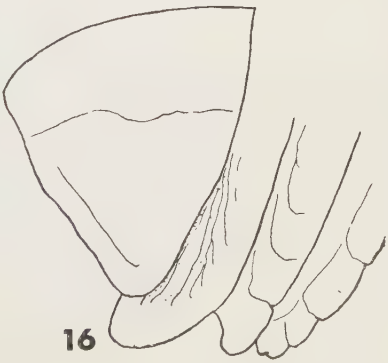

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PLATE II

the keels of the collum is as illustrated for the female of *geayi*. *Diameter* 2.7 mm., *length* about 45 mm., 49 *segments*, 1 legless.

Type locality.—Morechal, Territory of Delta-Amacuro, Venezuela; Aug. 6, 1950; W. L. Burger; 1 male, 1 female.

Order SPIROBOLOIDEA
Family RHINOCRICIDAE
Rhinocricus smithi Pocock

Rhinocricus smithi Pocock, 1908, Biol. Centr.-Amer., Diplop. p. 63.

El Soledad, Oaxaca, Mexico; Aug. 18, 1949; W. L. Burger; 1 male, diameter 11.2 mm., 54 segments; 1 female, diameter 12.6 mm., 54 segments.

Rhinocricus potosianus Chamberlin

Rhinocricus potosianus Chamberlin, 1941, 52:252-253, fig. 9.
Rhinocricus potosianus Chamberlin, 1943, Bull. U. Utah, Biol. Ser. 8(3): 20, figs. 26, 27.

Tamazunchale, San Luis Potosi, Mexico; July 10, 1937; Ottys Sanders; 1 male, 3 females, several larvae.

Rhinocricus dispar, n. sp.
Figs. 9-11

A small species with the anterior gonopods very near those of the widely distributed *R. monilicornis* (Porat 1876), as illustrated by Chamberlin (1950); also near *R. finitis* Chamberlin 1950, from which it is distinguished by its inconspicuous banding and differences in the proportions of the parts of the anterior gonopods.

Male holotype.—In alcohol the prozonites are dark brown and the metazonites, legs, antennae, borders of the collum, and apex of the caudal tergite are red brown. Antennae with numerous sensory cones. Eyes more than twice their width apart, the ocelli in 6 rows of 7 to 3. Cephalic sulcus slightly interrupted in the middle. Clypeal foveolae 2 + 2.

Collum broadly rounded at sides, the marginal sulcus reaching as high as the middle of the eye. Surface of tergites shining; under magnification it is seen to be finely coriaceous, with the metazonites slightly rougher than the prozonites. Segmental sulci distinctly impressed above; sulci bend sharply around behind pores, almost touching them. A distinct secondary sulcus crosses the dorsum in front of the primary one,, ending at level of pores. Horizontal striae of metazonites become irregularly shortened approaching the pores and are continued a little above them. Scobinae begin as small pits at about the ninth segment and end at about the thirty-seventh; in the middle of the body they are about four times their width apart and appear as in figure 9. Apex of caudal tergite rounded acute; from a dorsal view it just barely covers the valves. Margins of anal valves but slightly inflated. Anal scale three times as wide as long, the apex of the posterior margin obtuse. Coxae of third through seventh legs produced below in thick, triangular lobes, those on the third and fourth legs largest.

Anterior gonopods as shown in figure 10. Posterior gonopods (Figs. 10, 11) distinguished from those of *monilicornis* by the rounded apex of the seminal branch and the straight apex of the anterior branch.

Diameter 3.3 mm., 45 *segments*.

Type locality. Morechal, Territory of Delta-Amacuro, Venezuela; Aug. 6, 1950; 1 male; W. L. Burger.

Oxobolus magnificus, n. sp.
Figs. 12-15

A large species closely resembling several others in appearance; distinguished by the posterior gonopods, in which a longitudinal ridge on the anterior surface interrupts the apical margin.

Male holotype.—In alcohol the metazonites, borders and middle of collum, borders of anal valves, anal scale and labrum are olive yellow; prozonites are olive gray; legs and antennae are red orange. Head shining, almost without punctures, the medial longitudinal furrow interrupted in the middle; clypeal foveolae 5 + 4. Eyes subcircular, with about 23 ocelli in 5 rows. Collum and second tergite as shown in figure 12. Third and fourth tergites not produced into ventral lobes, as in *O. tardus*, although there are a few scallops below. On succeeding segments, except the last, the scallops give way to relatively small spinous points, which never extend as high as the pores (Fig. 13). Segmental sulci represented by light colored lines rather than by depressions on the dorsum. Surface of tergites shining, smooth; under magnification it is seen to be finely and evenly coriaceous. Apex of anal tergite thin, obtuse, closely appressed to anal valves and much surpassed by them. Mesial margins of anal valves moderately swollen, appressed. Posterior margin of anal scale almost straight except for the small angle as in *O. cinctus* Chamberlin 1922.

Coxae of legs 3, 4, and 5, produced ventrad into flattened, triangular lobes, the fifth largest. Coxae of seventh legs typically enlarged and without triangular lobes below. One or more articles of the third through the seventh legs flattened and thickened along the ventral margin.

Medial coxites of anterior gonopods a little longer and more attenuated than in *O. tardus;* inner curvature of telepodites with the typical, short setae. Posterior gonopods as shown in figures 14 and 15.

Diameter 13 mm., 44 *segments*, 1 legless.

Type locality.—Three miles northwest of Rancho Monserrate, Chiapas, Mexico; Aug. 3, 1949; W. L. Burger; 1 male.

Oxobolus tardus, n. sp.
Figs. 16-18

The smallest member of the genus, with the anterior gonopods similar to those of *O. stolli* (Pocock 1908), from which it is distinguished by the structure of the posterior gonopods and by the presence of small spinous points on the posterior margin of the tergites below the pores.

Male holotype.—In alcohol the metazonites, legs, and borders of the collum are light orange, and the prozonites and collum are gray. Vertex finely punctuate, labrum more coarsely so; medial longitudinal furrow of head complete; clypeal foveolae 3 + 3. Eyes subelliptical, with about 25 ocelli in 4 vertical rows. Antennae with four sensory cones. Anterior margin of collum (Fig. 16) bowed forward slightly at level of eye; from this level to the ventral angle a marginal sulcus makes a broad border; from the same level an indistinct, irregular, longitudinal line extends from the anterior margin to the posterior and then intermittently across

the tergites to the first pore. Keels of second tergite not quadrate as in related species, but with the posterior margin broadly rounded. As usual, there is a depression above the margin of the keels of the second tergite for the reception of the ventral angles of the collum. The oblique and horizontal striae are continued on the posterior margin of the metazonites as a few gentle scallops on the anterior segments and on all succeeding segments except the last as small spinous points; the spinous points reach halfway or more but never above the pores. Well impressed segmental sulci begin on the third segment. Metazonites slightly raised above prozonites. Under magnification the surface of the tergites is seen to be finely punctuate and sparsely and irregularly longitudinally striate, with the metazonites more thickly covered than the prozonites. Pores in front of and usually touching the segmental sulci. Apex of caudal tergite swollen and extending as far back as the anal valves do. Margins of anal valves moderately swollen and tightly appressed, the ectal surfaces of the margins abruptly raised. Posterior margin of anal scale almost straight.

Coxae of legs 3 and 4 produced ventrad into thick, triangular lobes, with the fourth longer. Coxae of seventh legs typically enlarged and with small, triangular lobes below.

Anterior gonopods as in *O. stolli* except that the setae on the inner curvature of the telopodites are shorter and sparser. Posterior gonopods (Figs. 17, 18) with the apical surface smooth, while in *O. stolli* this area is roughened.

Diameter 5.7 mm., 40 *segments*, 1 legless.

Type locality.—17 miles southwest of Simojoval, Chiapas, Mexico; Aug. 18, 1949; W. L. Burger; 1 male.

Oxobolus spp.

Several females from 2 miles northwest of Rancho Nuevo, Chiapas; 17 miles southwest of Simojoval, Chiapas; and 17 miles south of Tamazulapan, Oaxaca, Mexico, represent at least three other species.

Order POLYDESMOIDEA
Family XYSTODESMIDAE
Rhysodesmus viabilis Chamberlin

Rhysodesmus viabilis Chamberlin, 1943, Bull. U. Utah, Biol. Ser. 8(3): 47-48, figs. 105, 106.

Valles, San Luis Potosi, Mexico; July 15, 1937; Ottys Sanders; 2 males. Coxae unspined; spines of sterna much sharper than in *R. sandersi* and directed cauded rather than slightly laterad.

Rhysodesmus tabascensis Pocock

Rhysodesmus tabascensis Pocock, 1909, Biol. Centr.-Amer., Diplop. p. 198, pl. 15, fig. 2.

Rhysodesmus tabascensis Pocock. Attems, 1938, Tierreich, Polydesmoidea II, p. 142.

Rancho Nuevo, Chiapas, Mexico; Aug. 10, 1949; W. L. Burger; 1 female, 10.2 mm. wide. The determination must be regarded as tentative until males have been described. Coxae unspined; sternites with large, blunt pegs adjacent to the coxae. In alcohol the dorsum is brown and the legs and entire keel areas are yellow.

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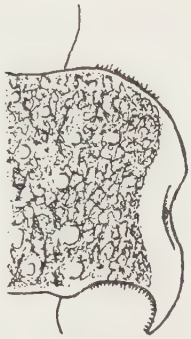

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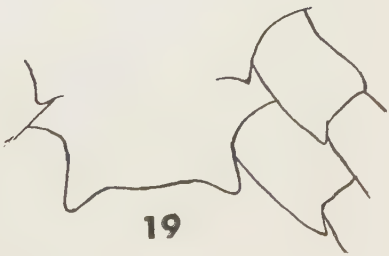

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PLATE III

Rhysodesmus sandersi, n. sp.

Figs. 19-20

Distinguished from *R. potosiansis* Chamberlin 1942, which occurs in the same area, by the wider seminal branch and the curved accessory branch of the male gonopods and by the yellow transverse bands on the dorsum. The spined sternites and coxae are especially distinctive, but it is not known whether *potosiansis* has these spines or not.

Male holotype.—In preservative the color is almost gone, but there are indications that the keels, wide bands across the posterior margin of the metatergites, border all around the collum, and a narrow longitudinal band on the collum were yellow. Keels and collum the usual shape and the dorsum arched as usual. Surface of metatergites smooth and shining, but under magnification it is seen to be finely coriaceous. Metasternites, beginning with the eighth segment, weakly spined ajacent to the first legs of each segment and strongly adjacent to the second legs; figure 19 shows the appearance of the spines on the thirteenth segment, which is rather typical of all segments except the eighteenth, where they are blunt and much closer together. Coxae also spined from the ninth segment on back, but the coxal spines are neither as long nor as sharp as those on the prefemurs.

Gonopods as shown in figure 20; tarsal spine easily broken off.

Length about 48 mm., *width* 11 mm.

Type locality.—Tamazunchale, San Luis Potosi, Mexico; 2 males; July 10, 1937; Ottys Sanders, for whom the species is named, was the collector.

Family EURYURIDAE

Amplinus xelitlus Chamberlin

Amplinus xelitlus Chamberlin, 1943, Bull. U. Utah, Biol. Ser. 8(3):57, fig. 135.

Valles, San Luis Potosi, Mexico; July 15, 1937; Ottys Sanders; 1 female, 11.8 mm. wide. The determination must be regarded as tentative because it was made from a female.

Amplius intermittens, n. sp.

Figs. 21-22

Similar to *A. palicaudatus* (Attems 1901) in size and in the structure of the gonopods; distinguished by the conspicuous intermittent medial line on the metatergites and the tessellated polygonal areas on the entire surface of all metatergites except on the last two segments.

Male holotype.—In alcohol the entire keel areas, a small, square area in the middle of the posterior two rows of the polygonal areas of the metatergites, an hourglass area on the collum, and all of the cauda are white; remainder of dorsum and pleurites dark gray brown; legs, antennae, and venter light brown.

The keels are high, almost horizontal on the middle body segments, and relatively narrow. The prozonites are well exposed. The lateral margins of all keels are thickened, and the pores open laterad on the marginal thickenings, but are partly visible from above. Metazonites, except on the last two segments, completely covered with flat, tessellated, elongated polygonal areas, of which there are four rows on the collum and

three on all of the remaining metatergites; on most segments, the areas in the middle row are largest and there are about 14 in the row. On the nineteenth metazonite, the two rows on the posterior half of the metazonite are preceded by one obsolete row and by an unsculptured band. Caudal segment without sculpture; sides of cauda almost parallel; posterior margin of cauda wavy with four low, broad crenulations. Metapleurites coarsely granular, the posterior margin of the fifteenth through seventeenth produced as three or four blunt spines. Anal scale as in figure 21. Metasternites of segments nine through 18 produced into blunt lobes adjacent to the coxae; each metasternite divided into four quadrate areas by two intersecting furrows.

Gonopods typical of the genus, with the apex of the telopodite bifid (Fig. 22).

Length about 50 mm., *width* of metazonites 7 mm., *width* of prozonites 4 mm.

Type locality.—15 miles south of Pichucalco, Chiapas, Mexico; Aug. 19, 1949; W. L. Burger; 1 male.

Polylepiscus burgeri, n. sp.
Fig. 23

This large species, with the caudal angles of the middle body keels strongly elongated and hooked, is related to *P. heterosculptus* (Carl 1902) and *P. actaeon* Pocock 1909. It is distinguished from the former by having the medial part of all metazonites sculptured and the greater part of the keel area yellow, and from the latter by the absence of basal shoulder prominences on the anterior margin of any of the keels. More keels appear to be serrulated than in any other species; the anterior margin of 6 through 17 and the posterior margin of 4 through 16 are serrulate.

Female holotype.—In alcohol the dorsum is brown with almost the entire keel area and the posterior half of the anal tergite yellow; legs and sternites yellowish brown; head and antennae brown.

Prozonites and head smooth and shining. Metazonites, except for nineteenth and raised margins of keels, entirely but not uniformly covered with coriaceous polygonal areas and small, smooth tubercles. Collum covered with shining, flat areas, less coriaceous than the following segments, the number of rows uncertain. Metazonites 2 through 4 with 3 transverse rows of polygonal areas, with 12 to 14 in each row. On the following segments the polygonal areas become increasingly smaller, more coriaceous, and more numerous, appearing indistinctly to be in 4, then in 5, transverse rows, until on the fifteenth and succeeding segments they are almost obsolete except in the marginal row, where they coincide with the tubercles. A few small, smooth tubercles are scattered over the collum and the keels of the anterior metazonites; they become more numerous on posterior segments, with 4 or 5 transverse rows on segments 16 through 18; all are irregularly placed except the caudal row. Tergites 19 and 20 are coriaceous but without tubercles. Metapleurites thickly granular, the posterior margin of the eighth through eighteenth produced as 3 or 4 blunt spines. Keels large, slightly sloping, with the caudal angles on segments 5 through 17 produced as acute hooks (Fig. 23), of which the first two and the last pairs are less sharp than the others. Keels of segments 18 and 19 triangular. Anterior margin of keels

on an almost straight line with anterior margin of metazonite; caudal margin of keels 15 through 18 with very slight basal shoulder prominence. Lateral margin of poriferous keels deeply excavated toward pores, except the eighteenth, which is only slightly excavated, and the nineteenth none at all; lateral margin of nonporiferous segments not excavated. Cauda wide, the sides parallel, the posterior margin straight, and the corners rounded. Anal scale hemispherical, with the margin between the setae convex and the tubercles almost obsolete. Metasternites divided into four approximately equal areas by two intersecting furrows.

Length about 85 mm., *width* 13 mm.

Type locality.—17 miles south of Simojoval, Chiapas, Mexico; Aug. 18, 1949; 1 female; W. L. Burger, for whom the species is named, was the collector.

A female from 15 miles south of Pichucalco, Chiapas, corresponds with the holotype except that the width is 10.5 mm., the length about 70 mm., and the posterior margin of the cauda is slightly convex.

Family RHACHIDESMIDAE

Strongylodesmus geddesi Pocock

Strongylodesmus geddesi Pocock, 1909, Biol. Centr.-Amer., Diplop. p. 173, pl. 13, fig. 5.

Strongylodesmus geddesi Pocock. Attems, 1940, Tierreich, Polydesmoidea III, p. 479, fig. 678.

Valles, San Luis Potosi; July 15, 1937; Ottys Sanders; 1 male, 6.4 mm. wide. Tamazunchale, San Luis Potosi, Mexico; July 10, 1937; Ottys Sanders; 1 male, 6.3 mm. wide; 1 female 7.4 mm. wide. Except for the larger size, these specimens correspond with Pocock's description.

Explanation of Figures

Plate I

Orthoporus unicus, n. sp., male holotype. Fig. 1, left keel of collum. Fig. 2, left gonopod, anterior view; *a,* anterior lamina; *p,* posterior lamina; *t,* telopodite. Fig. 3, end of telopodite of left gonopod; *c,* carolla; *s,* seminal spine.

Chamberlineptus morechalensis, n. gen., n. sp. Fig. 4, right keels of first two segments, male holotype. Fig. 5, right gonopod, anterior view, male holotype; *k,* knee process. Fig. 6, right keel of first segment, female paratype.

Venezueneptus liber, n. gen., n. sp., male holotype. Fig. 7, right keel of first segment.

Plate II

Venezueneptus liber, n. gen., n. sp. Fig. 8, right gonopod, anterior view; *ta,* tarsus.

Rhinocricus dispar, n. sp., male holotype. Fig. 9, scobina from twenty-fifth segment. Fig. 10, anterior view of gonopods, right posterior one removed. Fig. 11, end of right posterior gonopod.

Oxobolus magnificus, n. sp., male holotype. Fig. 12, right side of first three segments. Fig. 13, left side of thirty-sixth segment. Fig. 14, right posterior gonopod, anterior view. Fig. 15, same, posterior view.

Oxobolus tardus, n. sp., male holotype. Fig. 16, left side of first three segments.

Plate III

Oxobolus tardus, n. sp. Fig. 17, left posterior gonopod, anterior view. Fig. 18, same, posterior view.

Rhysodesmus sandersi, n. sp., male holotype. Fig. 19, metasternite and coxae of thirteenth segment. Fig. 20, telopodite of left gonopod, lateral view.

Amplinus intermittens, n. sp., male holotype. Fig. 21, anal scale. Fig. 22, telopodite of left gonopod, lateral view.

Polylepiscus burgeri, n. sp., female holotype. Fig. 23, right keel of sixteenth segment.

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PROCEEDINGS
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A NEW SNAKE, *PHYLLORHYNCHUS ARENICOLA*, FROM THE GULF OF CALIFORNIA, MEXICO

By Jay M. Savage and Frank S. Cliff

Natural History Museum, Stanford University, California

On the evening of April 15, 1952 the authors, accompanied by two other biologists from the Sefton Foundation's research vessel, *Orca*, put ashore on Isla Monserrate in the Gulf of California to investigate snake tracks discovered that afternoon. We had assumed that the tracks had been made by *Chilomeniscus* or *Hypsiglena* which are known from other islands in the vicinity but have not been reported from Monserrate. It was, therefore, with considerable surprise that within a few minutes of our arrival we captured the first specimen of the genus *Phyllorhynchus* ever taken from an island in the Gulf of California. Further search uncovered a second example of the same form which appears to represent a distinct undescribed species.

The privilege of visiting Monserrate and other islands in the Gulf was provided through the great kindness of Mr. Joseph W. Sefton, Jr., of San Diego, who organized the Sefton Foundation-Stanford University Expedition to the Gulf of California of which we were members. The Expedition visited most of the major islands in the Gulf and obtained over 1,000 herpetological specimens for the Natural History Museum of Stanford University. We are deeply indebted to Mr. Sefton for the opportunity of visiting this fascinating region. We also wish to thank Mr. George E. Lindsay of Stanford, director of the Expedition's scientific personnel, for his aid and cooperation aboard the *Orca*.

Dr. George S. Myers of Stanford University has generously read over this manuscript and offered useful comments and suggestions.

Phyllorhynchus arenicola, new species

Holotype.—An adult male, number 14013, in the collections of the Natural History Museum of Stanford University. Taken in the sand dunes along the southwest coast of Isla Monserrate, Gulf of California, Mexico, on April 15, 1952 by Frank S. Cliff, John P. Figg-Hoblyn, Jon M. Lindbergh and Jay M. Savage. The female paratype was taken at the same time and place.

In the following description specific counts for the female paratype are listed first, followed by the figure for the holotype in parentheses.

Diagnosis.—A member of the *decurtatus* section of the genus, readily distinguished from all other *Phyllorhynchus* by the combination of the following characteristics: (1) dorsal body blotches 30-32 in number, at

Fig. 1. Map of southwestern United States and adjacent parts of Mexico showing distribution of the subspecies of *Phyllorhynchus browni*. A.—*P. b. lucidus*. *B.*—*P. b. browni*. The dot indicates the only locality from which *P. b. fortitus* has been obtained.

least twice as wide as light interspaces when measured longitudinally near mid-body; at least one fourth of these blotches partially split by a light medial area; (2) four to six lateral scale rows suffused with brown, this suffusion not extending on to back between dorsal blotches; (3) lateral spots large, distinct; (4) ventrals 164 in the male, 172 in the female; (5) caudals 39 in the male, 31 in the female.

General Characteristics.—A colubrid snake with moderately stout body, somewhat flattened below but essentially cylindrical. Tail relatively short, decreasing rapidly in girth posteriorly. Head only slightly distinct from body, short with a blunt snout; not as broad as trunk at mid-body. Mouth inferior, overhung by the rostral plate which has free lateral edges. Nostrils vertical, closed by a valve. Eyes moderate, pupil vertically sub-elliptic. Coloration unique, reminiscent of that of *Arizona elegans phillipi*.

Lepidosis.—Rostral well-developed, extending posteriorly between internasals to a point level with postnasal, with free lateral edges that are grooved. Ventrally, rostral concave, indented along margin of attachment with upper lip. When viewed from above rostral truncate; bulging slightly medially when viewed laterally. Internasals triangular, separated from each other by rostral; in contact laterally with pre- and postnasals. Prefrontals almost rectangular but for a small lateral projection which contacts the upper loreal on side of head. Anteriorly the pre-

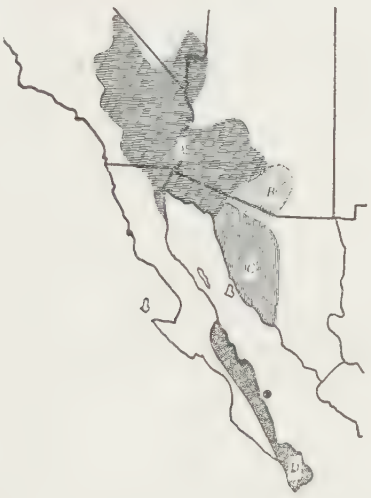

Fig. 2. Map showing ranges of Decurtatus section of *Phyllorhynchus* in the United States and Mexico. A.— *P. d. perkinsi.* B.— *P. d. nubilis.* C.— *P. d. norrisi.* D.— *P. d. decurtatus.* The dot in the Gulf of California represents Isla Monserrate, the type locality of *P. arenicola.*

frontals contact posterior tip of rostral and internasals, posteriorly meeting frontal, one or two upper preoculars and a supraocular. Frontal four-sided, longer than broad, narrowest posteriorly; anteriorly in contact with prefrontals, laterally meeting supraoculars. Frontal in contact posteriorly with parietals. Supraoculars triangular, anteriorly contacting upper preocular and prefrontal, dorsolaterally meeting frontal and posteriorly parietal and upper postocular. Parietal pentagonal, meeting frontal, supraocular and two postoculars anteriorly, laterally bordered by three or four scales including temporals. Three scales contact parietals along their posterior margins. Nostril between two nasal shields with the flap of the nasal valve attached to postnasal. Prenasal rectangular, higher than long, meeting internasal above and rostral, first supralabial and postnasal below nostril. Postnasal roughly pentagonal, in contact with internasal, lateral projection of prefrontal, two loreals and first two supralabials. Loreals two or three; upper largest, higher than broad; if two lower loreals present they meet at point level with middle of upper loreal. Anterior lower loreal meeting second and third supralabials, the two other loreals and the postnasal; posterior lower loreal contacts one preocular, one subocular and third and fourth supralabials. If one lower loreal is present it is formed by fusion of two loreals and meets the same scales as the two meet individually. Ocular semicircle composed of seven to nine scales (exclusive of supraocular): two or three preoculars, three suboculars and two or three postoculars. Temporals 3 + 2, irregular. Supralabials six; first triangular, anterior apex in contact with rostral. First five infralabials higher than long, fifth larg-

est; sixth twice as long as tall, large. Fourth and fifth supralabials separated from eye by suboculars.

Mental shield triangular, anterior edge thin, almost transparent, in contact with first pair of infralabials. Infralabials nine, first pair greatly enlarged, separating anterior chin shields from mental. Second and third infralabials elongate, much higher than broad, slightly imbricate; second and third in contact with anterior chin shield; fifth greatly enlarged; sixth through ninth small, hardly distinguishable from gular scales, last two overhung by last supralabial when mouth closed. First pair of chin shields largest, in contact with elongate second pair along posterior external edge. Second pair separated from each other by a large scale; separated from first ventral by four gular scales.

Body encircled by 21-19-17 rows of smooth scales which have a single apical pit. Anal single. Ventrals 172(164), caudals 31(39).

Dentition.—Maxillary bone with 11 teeth, eight before and four slightly enlarged ones after the diastema. While palatine and pterygoid bones were not dissected there appears to be three or four teeth on the palatal region of the mouth.

Hemipenes.—Dissected in place in the tail they extend to the 14th caudal. Sulcus spermaticus divided at the very tip of the organ (within the 14th caudal). Hemipenis slightly bifurcate with a band of enlarged spines on each side of sulcus. On side opposite sulcus there is a wide groove which is spinate, having largest spines proximally and spine-size decreasing distally.

Measurements in Millimeters.—Standard length (snout to anus) 285 (286), tail length 32(66), length of head (tip of snout to angle of jaws) 10(12), head width 7(8.5), greatest diameter of orbit 2.5(3).

Coloration.—Top of head pinkish or grayish brown, with darker brown motlings arranged in no definite pattern. Rostral plate flesh colored, marked with a few obscure dark punctated areas which are most concentrated at posterior tip. Side of head lighter, marked with a few dark brown flecks. A dark brown subocular stripe about as wide as two supralabials extending from lower posterior corner of eye to angle of mouth. Stripe conspicuous but without an evenly defined margin.

Basic ground color of dorsum almost white. Upon this color are superimposed lateral spots, a lateral suffusion and a series of 32(30) brown dorsal blotches. Interior of dorsal blotches light brown but they are outlined by a narrow dark brown border. Blotches about five scales long, twice as wide as light interspaces when measured longitudinally; 10(11) blotches interrupted medially by a light area about two scales long. This light area completely splits some blotches on one side. A series of 50(48) lateral spots along sides, alternating with dorsal blotches. These spots located in a brownish lateral area which forms a continuous suffusion from neck to tip of tail. This suffusion is four to six scale rows wide but does not extend on to back between dorsal blotches. Light interspaces between dorsal blotches almost immaculate, sharply contrasting with blotches, spots and lateral suffusion.

Tail similar in coloration to dorsum with 6(7) caudal blotches and lateral spots only faintly evident.

Lower labials and chin shields light with a very few fine brown dots. Venter and underside of tail immaculate white.

Relationships.—This new form obviously is most closely allied to

Phyllorhynchus decurtatus decurtatus of the Baja California mainland. The two forms share the characteristics of relatively broad dorsal blotches, low number of blotches and the smooth or inconspicuously keeled scales of the males. They differ in caudal counts in both sexes (male *decurtatus* with 33-36 caudals, male *arenicola* with 39; female *decurtatus* with 22-26, female *arenicola* with 31). The new species further differs from *P. d. decurtatus* and all other members of the genus by its peculiar cororation. In addition *arenicola* may be separated from snakes of the *browni* complex which it resembles more closely than does any other ally of *decurtatus* by having 30-32 dorsal blotches (9-15 in the subspecies of *browni*) and in the presence of distinct lateral spots (absent in *browni*). From *P. decurtatus perkinsi* it may be distinguished by the lower ventral count (male *perkinsi* with ventrals 168-182 and females with ventrals 181-196 as compared with the Monserrate leaf-nose in which the male has 164, the female 172), the larger size of the dorsal blotches (in *perkinsi* the blotches are approximately half as wide as the light interspaces, in *arenicola* the blotches are twice as wide as the interspaces) and in the extent of the lateral suffusion (reaching between body blotches and well up onto back in *perkinsi* but restricted to the sides in *arenicola* and not invading the region between the blotches). The new form cannot be confused with *P. decurtatus norrisi* of Sonora because of the coloration, the higher ventral and caudal counts (male *norrisi* with 151-156 ventrals and 31-34 caudals, the one known female with 166 ventrals and 24 caudals as compared with the corresponding counts of 164, 39 and 172, 31 in *arenicola*) and the keeling of the dorsal scales in adult males (*norrisi* males conspicuously keeled, *arenicola* male smooth). Probably when additional material of the new form is obtained, adult males of larger size than the type may prove to have faintly keeled scales as in some male *P. d. decurtatus*. *P. d. nubilis* has many more body blotches than *arenicola* (42-60 in the former, 30-32 in the latter) and fewer caudals (30-33 in male *nubilis*, 20-24 in females as compared with male 39, female 31 in *arenicola*).

The Monserrate species appears to have arisen directly from *P. d. decurtatus* through isolation in an insular environment and by changes in basic coloration and lengthening of the tail. In pattern *P. arenicola* shows some resemblances to *P. browni* certain examples of which also have extremely large dorsal blotches and a tendency for these blotches to be invaded laterally by the light ground color. These similarities do not appear however to be indicative of close relationship between *arenicola* and *browni*. Actually the coloration of the new form can best be explained as a modification of the pattern of *P. d. decurtatus*. Occasional specimens of this subspecies from Baja California have an accessory series of dorsal dark blotches (Klauber 1935, p. 11) which practically doubles the blotch count. The pattern of the Monserrate snake was apparently formed through a fusion of these primary and secondary blotches to form double sized ones. The light centers of many of the *arenicola* blotches thus would seem to represent the light interspaces between the "original" *decuratatus* blotches, which have not been completely eradicated during the fusion. The arrangement of the lateral spots in *P. arenicola* supports this view, there being spots located not only opposite each light interspace and alternate with the dorsal blotches but also opposite the light medial areas of the partially split blotches.

Field Notes.—Isla Monserrate is located on the west side of the Gulf of California at 25° 40′ N., 111° 02′ W. It is of volcanic origin and is about four miles long and two miles wide. At its points of closest approach to the Baja California mainland the island is separated from the Peninsula by seven or eight miles of water which reaches depths of 480 feet.

Both examples of the new species were obtained in the early evening (9:00 P.M.) on the sand dunes along the southwest coast of the island. Numerous tracks apparently left by this species had been observed the previous afternoon indicating a large snake population. The types were discovered by using a Coleman gasoline lantern and wandering about the dunes. Both leaf-noses were in the process of burying themselves in the sand when approached but took off across the dunes before they were captured. Common in these same dunes during the day were *Dipsosaurus dorsalis carmenensis, Sceloporous magister monserratensis* and *Cnemidophorus pictus.*

The name *arenicola* is derived from the Greek (arena=sand + cola= dwelling) and refers to the habitat of the species.

Because the description of this form brings to three the number of additions to the genus since the publication of Klauber's review (1940, p. 211) a key to the known species and subspecies of the genus is presented below as an aid to identification. *P. browni fortitus* Bogert and Oliver (1945, p. 351) and *P. decurtatus norrisi* Smith and Langebartel (1951, p. 181) are the other forms described subsequent to Klauber's work.

AN ARTIFICAL KEY TO THE SPECIES AND SUBSPECIES OF THE SNAKE GENUS *PHYLLORHYNCHUS*

1a. Dorsal body blotches 15 or less; no well-developed lateral spots.....Browni section (fig. 1).

2a. Ventrals 166 or less in males, 179 or less in females; caudals 36 or less in males, 26 or less in females; dorsal blotches much wider than light interspaces.

3a. Dorsal blotches, at least near mid-body, four or five times as wide as light interspaces; blotches gray in color.....*P. browni fortitus*
(Known only from Alamos, Sonora, Mexico, but probably ranging over much of central Sonora east of the desert coastal region).

3b. Dorsal blotches less than three times as wide as light interspaces; blotches brown in color. *P. browni browni* (From southeastern Pinal County and Pima County, Arizona, west to Organ Pipe Cactus National Monument region. Also occurring in extreme north-central Sonora, Mexico).

2b. Ventrals more than 166 in males, more than 179 in females; caudals more than 36 in males, more than 26 in females; body blotches slightly wider than light interspaces.....*P. browni lucidus*
(Northwestern Maricopa County to northern Pima County, Arizona).

1b. Dorsal body blotches number 18 or more; well-developed lateral

spots present.....Decurtatus section (fig. 2).

4a. Dorsal body blotches usually only half as wide as light interspaces; ventrals 168 or more in males, 181 or more in females .....*P. decurtatus perkinsi*
(Colorado and Mojave Deserts of southern California, Arizona and Nevada and adjoining parts of Baja California and Sonora, Mexico).

4b. Dorsal body blotches equal to or exceeding the light interspaces in width; ventrals 167 or less in males, 176 or less in females.

5a. Venrals 156 or less in males, 166 or less in females .....*P. decurtatus norrisi*
(Desert regions of western Sonora, Mexico).

5b. Ventrals 157 or more in males, 171 or more in females.

6a. Dorsal body blotches 42 or more. *P. decurtatus nubilis* (Pima County, Arizona and probably adjacent Sonora, Mexico).

6b. Dorsal body blotches less than 42.

7a. Body blotches equal to or slightly exceeding interspaces in width; less than a quarter (usually none) of the blotches split by a light medial area; caudals in males 33-36, in females 22-26. *P. decurtatus decurtatus* (Central and Cape portions of Baja California, Mexico).

7b. Body blotches approximately twice as wide as interspaces; at least a quarter of the blotches partially split by a light medial area; caudals in in male 39, in female 31.....*P. arenicola*
(Restricted to Isla Monserrate, Gulf of California, Mexico).

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PROCEEDINGS
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A NEW MARSUPIAL OF THE GENUS ANTECHINUS FROM NORTHERN AUSTRALIA

By David H. Johnson
United States National Museum

Discovery of the small dasyurid mammal described below is one of the scientific results of the Arnhem Land Expedition of 1948, which was sponsored jointly by the Commonwealth of Australia, the National Geographic Society, and the Smithsonian Institution.

Antechinus bilarni, new species

Type specimen.—U. S. National Museum No. 283970, adult female, skin and skull; collected October 29, 1948, by D. H. Johnson; original no. 5919.

Type locality.—Oenpelli, East Alligator River, Northern Territory, Australia (latitude 12° 20′ S., longitude 133° 3′ E.).

Diagnosis.—A medium-sized *Antechinus* resembling *A. melanura* in general, but differing from that species in smaller body size, paler color, larger ears, more flattened skull, and larger alisphenoid bullae. Differing from *A. flavipes* in these same characters and also in longer and more penicillate tail, larger fourth premolars, and the presence of buffy patches behind the ears.

Description of type specimen.—Tail slightly longer than head and body (103 per cent), not incrassated; pinna of ear large and leaflike, extending 10 mm. beyond fur on dried skin; feet relatively slender, palmar and plantar pads striated. Color of fur on upper parts slightly grizzled Hair Brown (capitalized color terms are from Ridgway 1912); small patch behind each ear Cinnamon; underparts dull whitish with plumbeous bases of hairs showing through; line of demarcation between dorsal and ventral coloration obscure; cheeks pale; face without striped pattern; outer sides of legs dark; inner sides of legs and fore and hind feet whitish; tail not striped, colored almost like upper part of body, but bearing short whitish hairs basally and longer dark hairs terminally. Skull with narow rostrum and shallow, flat-topped braincase; orbitotemporal fossa large; frontals lacking postorbital processes and intertemporal constriction; anterior palatine foramina constricted and parallel-sided; palatal vacuities small, situated opposite posterior part of M^2, and each occupying an area about equal to occlusal surface of that tooth; alisphenoid part of auditory bulla large, appearing almost spherical, greatest diameter equal to nearly 14 per cent of condylobasal length. Crown of Pm^4 projecting slightly farther from alveolus than that of Pm^3, but its anteroposterior diameter notably less; Pm_4 minute, barely reaching to cingulum of Pm_3 and having about one-third the anteroposterior diameter of that tooth; first upper incisors slender and weak;

second, third and fourth upper incisors subequal, without apparent gradation in size.

Measurements of type specimen.—Head and body 106 mm.; tail 109; hind foot (with claw) 19; ear (from notch) 20; condylobasal length of skull 27.2; palatal length 14.6; zygomatic breadth 16.1; depth of braincase 7.0; interorbital breadth 5.7; length of nasals 10.7; breadth of combined nasals 3.8; diameter of alisphenoid bulla 3.8; length of upper tooth row ($C\text{-}M^4$) 10.4.

Habitat.—The type specimen was trapped in a well shaded and relatively cool situation at the base of a cliff on the northeastern side of Inyalark Hill, a small outlier of the rocky tableland of central Arnhem Land. For photographs of this hill and the surrounding area see Mountford (1949, pp. 763, 768, and 777).

Remarks.—The position of *Antechinus bilarni* with relation to other members of the genus, which is here considered to be relatively inclusive, is uncertain. None of the described forms is similar enough to be considered conspecific. The general resemblance to *Antechinus melanura* of New Guinea suggests ancient relationship of these two species, but the enlarged bullae and flattened skull of *bilarni* are too divergent to allow this form to be included among the subspecies of *melanura*. The notable flattening of the skull suggests relationship with the species that have been segregated under the genus *Planigale* (see Tate, 1947, pp. 133-135), but all those species are quite small in comparison with *bilarni*. The reduced condition of the last lower premolar is also considered by Tate to be characteristic of *Planigale*, but among specimens available to me, an equal reduction is present in *Antechinus maculatus sinualis* in which there is no flattening of the braincase. It seems that if the genus *Planigale* were to be extended to include all the flat-skulled species related to *Antechinus*, the genus would be so diverse that little reason would remain for maintaining it.

Antechinus bilarni is known only from the type specimen. Possibly the specimen from Port Essington recorded by Thomas (1888, p. 291) and another from Daly River recorded by Collett (1897, p. 334) as "*Phascologale flavipes leucogaster*" belong to the same species. The form *leucogaster* was originally described from the southwestern part of Western Australia. As described by Waterhouse (1846, pp. 417-418) and illustrated by Gould (1854, pl. 38), *leucogaster* is larger-bodied, shorter-eared, shorter-tailed, and more reddish brown than *bilarni*. The underparts appear to be nearly the same whitish color in both forms. The range of *leucogaster* in Western Australia, which according to Shortridge (1910, pp. 838-839) is narrowly restricted, is separated from Arnhem Land by approximately 1500 miles of arid desert that is apparently unsuitable for these animals. Another pale-bellied specimen of the *Antechinus flavipes* group has been recorded from Coomooboolaroo Station in the Dawson River Valley of central eastern Queensland (Collett, 1887, pp. 860-861; Thomas, 1888, p. 290, footnote).

As a tribute to an indispensable guide and the best of camp companions, this new species is given the name by which William E. Harney of Darwin, Australia, is known among the aborigines of Arnhem Land. Comparison with specimens of *Antechnius melanura* in the Archbold Collections at the American Museum of Natural History has been made possible through the courtesy of Dr. G. H. H. Tate.

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PROCEEDINGS
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TROPOTHRIPS IN NORTH AMERICA

(Thysanoptera; Phlaeothripidae)

By Lewis J. Stannard, Jr.
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In 1949 Hood and Faure nearly simultaneously erected generic categories for species of a seemingly novel type of tropical thrips. One of these species, *Tropothrips borgmeieri* Hood, was taken in Brazil; the other *Maxillata priesneri* Faure, was beaten from dead branches in Zululand. Since Hood's name *Tropothrips* appeared several months earlier it takes precedence over *Maxillata* Faure. Before me are two more species, a new one from Florida and a new one from Costa Rica. These latter two species are less spectacularly developed and somewhat bridge the morphological gap between the South American and South African extremes and the more primitive genus *Polyphemothrips*. It is interesting to note that these new species occur in a geographical area intermediate to the African and South American tropics, assuming that the Alaskan corridor was the only route for the past dispersal of thrips. By way of speculation, perhaps generalized entities similar to the two North American species described herein dispersed in part to the south and crossed the Isthmus of Panama and in part to the north and reached Africa. The progeny of these emigrants developed in a parallel manner to eventually produce *borgmeieri* and *priesneri*. The North American species could be regarded as derivatives of the ancestral stock that have remained near the point of origin of the genus.

In general, representatives of *Tropothrips* are much like species variously placed in *Adelothrips, Polyphemothrips, Docessissophothrips,* and other related Tubulifera. The only point of difference between *Tropothrips* and these others is in the length of the maxillary stylets. The stylets found in *borgmeieri* and *priesneri* are extremely long and much looped within the head, fig. 3. In the two North American species of *Tropothrips,* the stylets, while extremely long, are distinctly shorter, figs. 1 and 2, and are but slightly longer than the even shorter stylets found in such species as *Polyphemothrips tibialis* Hood, fig. 4. In the Tubulifera the characteristic of elongated stylets indicates evolutionary

specialization. *Tropothrips* has carried this tendency to the highest degree known.

With the knowledge of the two new species, it becomes apparent that *Tropothrips* is not far removed from its present day relatives. Nevertheless, for convenience, and in order to distinguish it as a highly advanced group, full generic rank still may be accorded *Tropothrips*. Species with maxillary stylets so long that they form several loops or partial loops within the head can be assigned to *Tropothrips;* similar species which have no more than one loop to each stylet, as in fig. 4, can be placed in *Polyphemothrips*.

The types of the new species have been deposited in the collections of the Illinois Natural History Survey.

Tropothrips Hood

Tropothrips Hood, Rev. de Ent., 20 (1-3):70. August 1949. Type species by original designation.—*Tropothrips borgmeieri* Hood.

Maxillata Faure, Ann. & Mag. Nat. Hist., 2, Ser. 12:852. November 1949. Type species by original designation.—*Maxillata priesneri* Faure. New synonymy.

Key to Adults

1. Mid and hind tibiae blackish brown; from Costa Rica ..... *nigripes* new species
   Mid and hind tibiae yellowish 2
2. Terminal antennal segment yellow; from Florida ..... *richardsi* new species
   Terminal antennal segment brown to blackish brown 3
3. Head generally light brown; from South Africa ..... *priesneri* (Faure)
   Head deep yellow; from South America ..... *borgmeieri* Hood

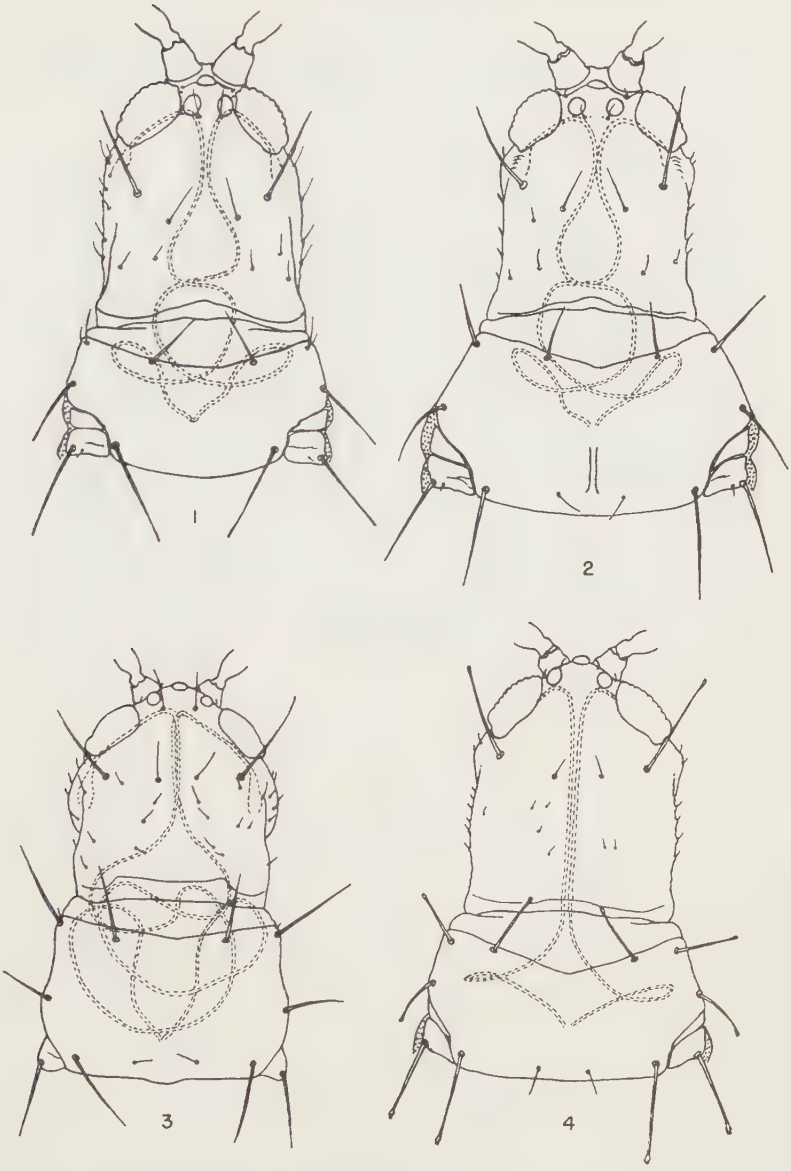
Tropothrips richardsi new species

Female (macropterous): Length, distended, exclusive of the antennae 2.5 to 3 mm. General color yellowish brown appearing somewhat orange because of the large quantities of red subintegumental pigments. Antennae mostly yellow except segments I and II which are brownish yellow and the apical half of segments III and IV which are clouded lightly with brown. Legs except coxae bright yellow. Wings faintly yellow. Tube yellowish orange at base, tipped with grey.

Head as in fig. 1, cheek pouches not greatly developed. Terminal antennal segment with a partial ventral suture marking the limits of morphological segments VII and VIII. Prothorax as in fig. 1, major posterior setae long, pointed to nearly blunt at the tips. Fore tarsal tooth small to moderate in size. Major abdominal setae long, pointed at tip, yellow in color. Body generally without strong striations or reticulations.

Male: Unknown.

Holotype.—Female; Everglades National Park, Fla.; Dec. 27, 1951; (Richards & Stannard); from leaf mould collected at the forest edge on Paradise Key. *Paratype.*—1 ♀; same data as for holotype.



Explanation of Plate

Head and Prothorax, dorsal aspect.

fig. 1, *Tropothrips richardsi* new species, female.

fig. 2, *Tropothrips nigripes* new species, male.

fig. 3, *Tropothrips borgmeieri* Hood, female. Redrawn from Hood.

fig. 4, *Polyphemothrips tibialis* Hood, female.

This species differs from the other three in having all of the legs, except the coxae, yellow. It is named after Mr. W. R. Richards, my companion on our visit to southern Florida, who, as he collected Collembola for himself, paused often to capture many valuable thrips.

Tropothrips nigripes new species

Female (macropterous): Length, distended, exclusive of the antennae, about 4 mm. General color orange brown to deep brown with much red subintegumental pigments. Bases of antennal segments I and III and fore tarsi yellow; tube orange except for grey tip. Wings light tan.

Head as in fig. 2, except maxillary stylets somewhat longer; cheek pouches more pronounced than in *richardsi;* terminal antennal segment with a partial ventral suture marking the limits of morphological segments VII & VIII. Prothorax as in fig. 2, except anterolateral setae smaller. Major body setae pointed to nearly blunt. Fore tarsal tooth moderate in size. Major abdominal setae long, pointed at tip, and yellow in color.

Male (macropterous), major form: Length, distended, slightly smaller than the female, about 3.6 mm. Coloration as in the female. Head and prothorax, fig. 2; fore femora greatly enlarged, fore tarsal tooth large.

Holotype.—Female; San Jose, Costa Rica; (Enrique Schmidt). *Allotype.*—1 ♂; same data as for holotype. *Paratype.*—1 ♀; same data as for holotype.

This species can be distinguished from the others by the dark color of the tibiae. All three specimens were from a miscellaneous collection kindly sent me for study by Dr. Willis Gertsch of the American Museum of Natural History, New York.

Vol. 67, pp. 85-86 March 22, 1954

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW GALLINULE FROM BOLIVIA

By W. E. Clyde Todd

The Gallinule, *Gallinula chloropus* of Linnæus, is a widely distributed species in the warmer parts of both the Old and New worlds. It breaks up into a number of geographical races, of which Peters (1934) recognizes no less than five in the Americas. South America is given three races, of which one comes from western Colombia and Ecuador, and one from the highlands of Bolivia and Chile, while a third has an extensive range over the eastern part of the continent, from Trinidad to Argentina. Bolivia has been credited with two races, but it now appears that there are actually three, since the birds of the Cochabamba region prove to be distinct from those of Lake Titicaca, the type-locality of *Gallinula chloropus garmani* Allen. The new race may be known as

		Measurements			
No.	Sex	Wing	Tail	Tarsus	Bill from gape
86132	♂	175	78	47	26
86133	♀	169	67	51	31 (estimated)
120247	♂	179	75	53	31
120248	♀	180	70	51	26

Corresponding measurements of six specimens of *Gallinula chloropus garmani* from Desaguadero, Lake Titicaca, Bolivia, are as follows:

94469	♂	218	90	59	30
94556	♂	203	84	58	27.5
94684	♂	212	95	57	27
94685	♀	192	85	51	30
94698	♀	197	85	51	26
94701	♀	202	91	59	29

Specimens examined.—Four, all from Vacas, as above listed.

Gallinula chloropus hypomelaena, subsp. nov.

Type, No. 120,247, Collection Carnegie Museum, adult male; Vacas, Department of Cochabamba, Bolivia, January 5, 1927; Francisco B. Steinbach.

Subspecific characters.—Similar to *Gallinula chloropus garmani* Allen of Lake Titicaca, Bolivia, etc., but markedly smaller (except bill).

Range.—At present known only from the type-locality, but presumably the Cochabamba region of Bolivia.

Remarks.—Our four specimens agree with *Gallinula chloropus garmani*

in darker general coloration and in the lack of a brownish wash on the upperparts, but they are much too small. On the other hand, they cannot be referred to *G. c. galeata* (Lichtenstein) of eastern Bolivia, which is not only larger, but has a decided brownish wash on the back. In their shorter tarsi they resemble *G. c. pauxilla* Bangs of western Colombia, but here again they differ in coloration. This new race is a miniature of *garmani,* which it probably replaces in the Cochabamba region.

Vol. 67, pp. 87-88 March 22, 1954

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW SQUIRREL FROM THE ANGLO-EGYPTIAN SUDAN

By Henry W. Setzer

United States National Museum

The study of a collection of mammals from the Anglo-Egyptian Sudan has shown the existence in that area of a new squirrel belonging to the genus *Heliosciurus*.

This study is being done in cooperation with the United States Naval Medical Research Unit Number Three and the Chicago Natural History Museum. All measurements are in millimeters, and capitalized color terms are from Ridgway "Color Standards and Color Nomenclature."

It is with great pleasure that I name this squirrel for Mr. Harry Hoogstraal who obtained the type series.

Heliosciurus gambianus hoogstraali subsp. nov.

Type.—Chicago Natural History Museum, no. 66723, adult male, from Ikoto, 2500 ft., Torit District, Equatoria Province, Anglo-Egyptian Sudan. Obtained 12 November 1949 by Harry Hoogstraal, original number 4799.

Specimens examined.—Sixteen, from: Ikoto, 9; Torit, 6; Obbo, 1.

Distribution.—Known from the area around Torit, Ikoto and Obbo, Anglo-Egyptian Sudan.

Diagnosis.—Coloration of upper parts mixed Cinnamon Buff, black, and white; individual hairs black at base, then banded buff, black, whitish and tipped with black. Eye with broad white stripe above and below, not connected. Cheeks, feet, hands, and stripe on outer edge of forearm clear buff. Tail alternately banded buff and black, the bands of about equal width. In fresh pelage, hairs of tail with wide white subterminal band. Belly, throat, chin, and outer surfaces of hind feet white. Basal one-fifth of tail and perianal region Cinnamon-Rufous. Skull large and robust. Upper toothrows parallel.

Measurements of type specimen.—Total length 417; length of tail 207; length of hind foot 51; length of ear from notch 16; total length of skull 49.1; condyloincisive length 44.1; zygomatic breadth 29.0; length of nasals 14.7; alveolar length of upper toothrow 9.3.

Comparisons.—From the type of *Heliosciurus gambianus madogae*, the new subspecies differs in darker color, white rather than buffy belly, and lateral white margins on the hind feet. The skull of *H. g. hoogstraali* is larger in all measurements taken; the auditory bullae are larger; the postorbital processes are shorter; the braincase is less rounded; the upper toothrows are parallel and not diverging posteriorly; the postpalatal vacuities are longer and narrower.

Compared with *H. g. lateris*, *H. g. hoogstraali* is darker in color, the feet are buffy instead of grayish, and the skull is larger in all respects (except that the nasals are shorter).

Compared with *H. g. bongensis*, *H. g. hoogstraali* is darker in color and larger in all measurements.

From *H. g. omensis* and *H. g. kaffensis*, *H. g. hoogstraali* differs in longer hind foot, white rather than gray belly, and a more buffy suffusion of the upper parts.

Remarks.—The six males and three females from Ikoto are remarkably uniform in color. Only one specimen varies markedly from the rest of the series, being somewhat paler.

One specimen from Obbo is somewhat different, in that it is lighter in color and lacks the white lateral margin on the hind foot. It is apparently an intergrade with *H. g. omensis* but more nearly approaches *H. g. hoogstraali.*

Three specimens from Torit show intergradation with *H. g. madogae* in the intermediate size of the auditory bullae, the straighter dorsal outline of the skull, and an intermediate condition in the divergence of the upper toothrows. These specimens are, however, more nearly like *H. g. hoogstraali.*

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PROCEEDINGS

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DESCRIPTIONS OF SOME UNDESCRIBED FORMS OF LACHINI (APHIDAE)

By F. C. Hottes

The species whose sexual forms are described herewith were described by the author in earlier papers.

Schizolachnus wahlea Hottes 1952

Alate male.

This form is described from four specimens, two taken in the fall of 1952 and two taken during the fall of 1953.

Size and general color.—Color not observed in life, all specimens having been taken for and with males of *Schizolachnus pini-radiatae* (Davidson) hence apparently quite simliar to the later species, and if not taken too early, definitely not banded on the abdomen as in the case of the apterous viviparous female. Length from vertex to tip of anal plate varying from 1.50-2.25 mm. Appendages and cornicles similar to those of apterous viviparous female.

Head and thorax.—Antennal segments with the following lengths: III .52-.60 mm., IV .30-.34 mm., V .27-.30 mm., VI .128-.157 + .042-.057 mm. Secondary sensoria distributed as follows: III, 44-57, as a rule more than fifty. IV, 18-24, as a rule more than 20. V, 7-10. All sensoria are rather small, rather tuberculate, and irregularly arranged, those on four and five are confined largely to one side of the segment. Primary sensoria on segments three and four apparently absent, if present similar to the secondary sensoria and not differentiated from them. Antennal hair sparce, the longest about two times width of segment, and set at an angle of about forty five degrees. Primary sensoria on fifth and sixth antennal segments very large, and very tuberculate. Hair on sixth antennal segment confined to basal half, or less, of segment, and very much inclined. Rostrum with last three segments with the following lengths: .114, .11, .04 mm. reaching to coxae of mesothorax or slightly beyond. Ocular tubercles present but extremely small.

Thorax and abdomen.—Media of forewings either once or twice branched, these wings are comparatively long and narrow. Metathoracic femora similar to those of described females and like them slightly deformed on apical half, varying in length from .97-1.08 mm. One would expect to find peg-like hair on the metathoracic femora, similar to those found on metathoracic femora of described females, but such is not the case. The peg-like hair are replaced by normal, but comparatively short hair. Hind tibiae varying from 1.57-1.71 mm. in length. Hair on hind tibiae .071 mm. long, much longer and very much finer in quality than those of described females. Hair on inner side of hind tibiae shorter than those on outer side. All hair inclined at an angle of about forty-five degrees. First segment of hind tarsus about .07 mm. in length and provided with about ten hair on the ventral surface, second segment of

hind tarsus .32 mm. in length. Cornicles similar to those of described females. Harpagones of the right and left sides different in shape, as well as in size.

One would not expect the male of this species to differ so greatly from the described females, none were taken in copulation, but they were taken on the same trees as oviparous females, in the type locality. Males of *Schizolachnus wahlea* differ from males of *Schizolachnus pini-radiatae* (Davidson) by having less pigmented area of the cornicles, shorter and less numerous hair on the femora and tibiae. *Schizolachnus pini-radiatae* males also appear to have the right and left harpagones similar in size and shape.

Allotype alate male deposited in the United States National Museum. Data: Carson Hole, Colorado, Sept. 15, 1953. Host *Pinus ponderosae.*

Cinara wahtolca Hottes 1953

Apterous Oviparous female.

This form is described from four specimens, all reared on twings of *Pinus edulis* placed in water. All were direct descendents of the original material, having been transferred, to the twig on which they developed, when not more than a day old. Specimens of this form are so similar in color and pulverulence, anterior to the cornicles that there is no need to again describe these features. Two of the specimens were identical to apterous viviparous females, they were taken as adults, but before the heavy pulverulent matter, posterior to the cornicles had developed, or before it was known that it would. The remaining two specimens were not found until eleven days later, a period of time apparently sufficient for the powder to develop. These specimens posterior to the cornicles had a band of heavy, thick, bluish-white velvet-like pile of pulverulent matter, which extended almost to the end of the abdomen. This band was continued over the sides of the body, but formed an incomplete and much narower band on the ventral surface.

Length from vertex to end of anal plate varying from 2.71-3.28 mm. Length of antennal segments as follows: III .42-.48 mm., IV .143-.185 mm., V. .24-.257 mm., VI .085 + .042 mm. Last three segments of the rostrum with the following lengths: .17, .143, .057 mm. The rostrum extends slightly beyond the metathoracic coxae. Hind tibiae varying from 1.71-2.07 mm. provided with numerous but atypic sensoria. None of the specimens show the pigmented areas anterior to the cauda, so characteristic of the viviparous females.

Morphotype deposited in the United States National Museum. Taken in Grand Junction, Colorado, Oct. 20, 1953.

Cinara piñona Hottes 1953

Apterous Oviparous female.

Color much like that of apterous viviparous female, and with no more powder. Antennae, legs and hair on same, similar to like structures on apterous viviparous female. Length varying from 3.27-3.50 mm. Length of antennal segments as follows: III .40-.429 mm., IV .20-.228 mm., V .228-.24 mm., VI .11 + .057 mm. Pigmented portion of cornicles varying from .157-.17 mm. actual size of cornicles larger. Hind tibiae varying from 2.28-2.43 mm. Hind tarsal segments .10-.11 and .228-.25 mm. Hind

tibiae with numerous but atypic sensoria. Specimens of this form lack the pigmented spots anterior to the transverse pigmented spots anterior to the cauda, viviparous females taken late in the fall also lack these spots.

Alate male.

Length varying from 2.14-2.35 mm. Antennal segments with the following lengths: III .386-.41 mm., IV .20.-228 mm., V .228-.24 mm., VI .1 + .04 mm. Secondary sensoria distributed as follows: III, 43 in only one case, as a rule more than 50, range in number 43-62. IV, 7-15, most common numbers 9-10, V, 3-9 most common numbers 5-6. Hind tibiae varying from 1.57-1.71 mm. Hind tarsal segments .071 and .21 mm. Head and thorax lightly covered with powder, abdomen dusky brownish-green. Abdomen free from powder for about twenty four hours after becoming adult. First powder indicated as lines along slides and six block shaped areas arranged in two rows on the dorsum of abdomen, anterior to the cornicles. These powdery areas increase in size until the entire abdomen anterior to the cornicles is covered.

Oviparous females of this speices differ from those of *Cinara edulis* (W) by having the pigmented portion of the cornicles much reduced, and in being smaller. Males of this species differ from the species described by Wilson by having the pigmented portion of the cornicles smaller, they also have both harpagones similar, not true of *Cinara edulis.*

Allotype alate male, deposited in the United States National Museum. Reared on twigs of *Pinus edulis,* in Grand Junction, Colorado, Oct. 10, 1953. Morphotype oviparous female, deposited in the United States National Museum. Reared in Grand Junction, Colorado, taken Oct. 4, 1953.

Vol. 67, pp. 93-99 June 4, 1954

PROCEEDINGS
OF THE
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A NEW SPECIES OF *CINARA* WITH NOTES ON SOME WESTERN SPECIES OF APHIDAE

F. C. Hottes and E. O. Essig

It is now over a third of a century since Swain described the species considered here. Since that time the species have been removed from the genus *Lachnus* in which Swain placed them, and are now placed in the genus *Cinara*. Swain's original descriptions adequate for the time in which they were written, no longer suffice to distinguish his species from those described more recently from the same hosts, therefore new descriptions seem desirable.

Cinara hirsuta n. sp.

Length from vertex to end of anal plate 3.57 mm. Color notes from life not available. The specimens are cleared. Head and thorax light dusky-brown. Antennae light dusky, with apical regions slightly darker. Femora pale at base, with apical regions darker. Tibiae dark brown for a very short region near base, followed by a pale band, which in turn is followed by dark-brown which makes up more than half of tibiae. Tarsi dark brown. Cornicles brown. Spiracles within pigmented areas. Dorsum of abdomen posterior to cornicles with a few irregular shaped pigmented areas, these areas also vary in size, and none are very large.

Antennal segments with the following lengths: III .58 mm., IV .25 mm., V .30 mm., VI .14 + .04 mm. Secondary sensoria distributed as follows: III 0-1, IV 0, V 1, primary sensoria present on all these segments. Apical half of fifth segment and all of sixth segment lightly imbricated. Antennal hair numerous, long, about .114 mm. and fine, that on anterior margin of third segment more numerous than hair on posterior margin, set at an angle of about forty-five degrees. Hair on dorsum of head about .12 mm. in length fairly numerous, but none is present on the posterior region of head. Dorsal regions of first and second antennal segments with quite a few hair. Ocular tubercles present but small. Rostrum reaching to mid region of metathoracic coxae. Third and fourth segments of the rostrum about equal in length. Hind tibiae 2.71 mm. in length, provided with numerous fine long hair, set at an angle of about forty-five degrees. Hair on outer margin of hind tibiae more numerous than that on inner margin. First segment of hind tarsus with about eighteen hairs. Cornicles about .40 mm. across, provided with numerous fine hairs which for the most part are of two lengths .6 and .12 mm. Dorsum of abdomen with numerous fine long hairs, which are about as long as the longest on the cornicles. Transverse pigmented area anterior to cauda divided, with the posterior

region provided with numerous long fine hairs, the hairs being longer than those on the dorsum of the abdomen. Cauda broad and rather shallow.

This species shows some relationship to *Cinara pinea* (Mordvilko) but its abdomen is free from the numerous small brownish pigmented spots, the pigmented spots being confined to the region posterior to the cornicles, being fewer and somewhat larger than those found in this region in *pinea*. The antennae and tibiae also have more hair. The first segment of the hind tarsus is shorter.

Holotype apterous viviparous female, deposited in the collection of E. O. Essig. Taken on *Pinus monticola* 12 miles north of Kirby, Oregon, June 6, 1941, by J. Schuh.

Cinara taxifoliae (Swain)

Lachnus taxifolia Swain 1919, 13-14.
Lachnus taxifoliae Swain, Palmer, 1926: 304. Misidentification.
Cinara taxifoliae (Swain) Gillette and Palmer, 1931: 872. Misidentification.

Apterous viviparous female.

Length from vertex to end of anal plate varying from 2.97-2.23 mm. Length of antennal segments as follows: III .347-.371 mm., IV .157-.185 mm., V .17-.20 mm., VI .11 + .028-.042 mm. Width of cornicles .057 mm. Length of hair on dorsum of abdomen varying from .04-.085 mm. The long and short hair being intermixed. Length of hair on third antennal segment varying from .057-.071 mm. The longer and also coarser hairs are on the anterior margin of the segment. Length of metathoracic tibiae varying from 1.43-1.74 mm. Length of first segment of hind tarsis .143 mm. length of second segment .31 mm. Hair on antennae sparse, inclined at a nangle of about sixty degrees to more upstanding. There are no secondary sensoria. The primary sensoria on the third and fourth antennal segments are absent, that on the fifth segment is at the extreme end of segment, round and with a wide rim. Ocular tubercles well developed. Last three segments of the rostrum with the following lengths: .143, .128, .057 mm. The apical segment of the rostrum is rather broadly pointed. Hair on outer side of hind tibiae of two types, a longer much coarser type set at an angle of only slightly less than ninety degrees, and a type about half as long set at an angle of about forty-five degrees. On the inner margin of the tibiae the hairs are also of two types as to length but about of the same quality, on this side the hair are set at an angle of about forty-five degrees. The longest hair are but slightly longer than the width of the tibiae, on basal half of segment, and slightly longer towards the apex. The hair are also more numerous on the inner margin than they are on the outer margin of the tibiae. Ventral surface of first segment of hind tarsis with about twenty hairs. Mesosternal tubercle absent. Spiracles surrounded with small pigmented areas. Dorsum of abdomen with three rows of wax pore plates to a side, these are rather more lateral than dorsal. Dorsum of abdomen with numerous hair. Cornicles reduced to mear rings, without pigmented base, about .057 mm. across. Transverse pigmented spots anterior to cauda divided, the inner ends rather far apart and fragmented into one or two spots.

Posterior margins of pigmented spots with five to six hairs, which are about .11 mm. in length. Cauda broadly rounded. Ventral plate broadly crescent-shaped with the ends blunt, the hair on this structure are few and confined to the ends.

Alate viviparous female.

Length varying from 2.60-3.14 mm. Antennal segments with following lengths: III .40-.42 mm., IV .171-.21 mm., V .185-.20 mm., VI .114-.143 mm. + .042 mm. Hind tibiae varying from 1.57-1.71 mm. Hind tarsi with following lengths: first segment .11 mm., second segment .328 mm. First tarsal segment with about eighteen hairs. Last three segments of the rostrum with the following lengths: .157, .114, .071 mm. Third antennal segment with 4-5 secondary sensoria, these are confined to one side of the segment, and are arranged in a straight row, all are rather tuberculate. Fourth and fifth antennal segments without secondary sensoria. Side of third antennal segment with secondary sensoria free from hair. Hair on this segment about .071 mm. in length, or slightly more than two times width of segment, hair not numerous, set at an angle of about sixty degrees. Media of fore wings twice branched, the second branch being closer to the margin of the wing than to the first. Dorsum of abdomen much like that of apterous viviparous female, differing from that form in having the transverse pigmented spots fragmented for their entire length into spots each provided with a single long sharp pointed hair. Hair on outer margin of hind tibiae about .143 mm. in length, or about twice the width of the segment, for the longest, shorter hair from a third to a half as long. Hair on inner margin of tibiae more numerous, more inclined and the longest less spine-like.

Described from four original slides, containing three apterous and three alate specimens, taken by Essig on Douglas fir *Pseudotsuga taxifolia*, in Capital Park, Sacramento, California, Aug. 15, 1912. One slide remounted by Essig in 1942, and in the Essig collection, is indicated as Lectotype, the apterous viviparous female on the same slide is indicated as the morphotype.

The ring-like cornicles, with no pigment at the base, distinguish this species at once from all other species of *Cinara* taken on *Pseudotsuga*. Apparently it has not been taken since Essig first took it in 1912.

Cinara arizonica (Wilson)

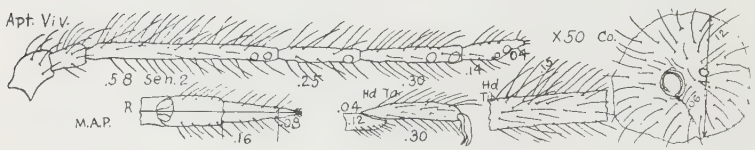
Lachnus sabiniansus Swain New Synonymy.

We have been able to locate only two of the original cotype slides, of *Lachnus sabiniansus* Swain both in the Essig collection. Neither of the slides is in good condition, but the slide on which two apterous viviparous females are mounted is the more useable, and is here indicated as the lectotype. All three specimens are practically free from hair, the hair having been lost for the most part in bringing the specimens to their present condition of useability by clearing and remounting.

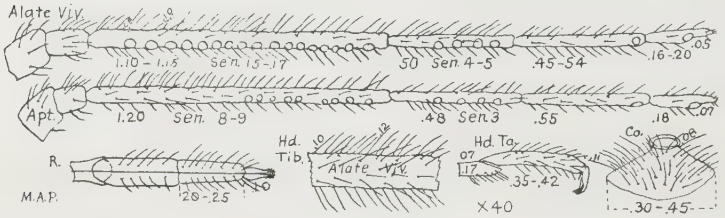
Cinara abieticola (Cholodkovsky)

Lachnus vanduzei Swain New synonymy.

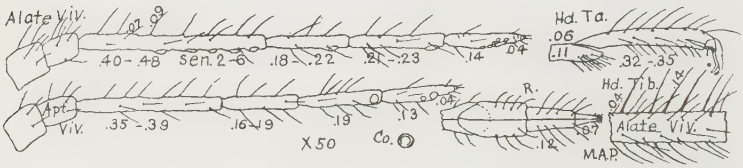
Dilachnus piceae (Walker) Swain 1921 Misidentification, of *Lachnus vanduzei* Swain.



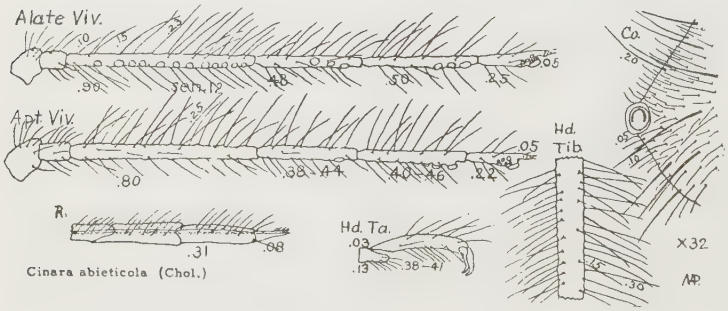
Cinara hirsuta n.sp.



Cinara ferrisi (S).



Cinara taxifoliae (S)



Cinara abieticola (Chol.)

PLATE VII

Cinaropis pruinosa (Hartig) Börner 1952 Misidentification, of *Lachnus vanduzei* Swain.

Cinara abieticola (Chol.) is reported from the United States under this name for the first time. Our determination has been checked by specimens sent by Dr. D. Hille Ris Lambers. The host of this species in Europe is *Abies* sp. on which host it has been taken in Golden Gate Park, San Francisco. We also have specimens of this species taken on *Cedrus deodara* on the campus of the University of California at Berkeley. *Cedrus* is an introduced genus of cedar to the United States. To these host species we can now add *Picea* on which host Van Duzee took the type material, which Swain described and named *Lachnus vanduzei*. The material taken by Van Duzee consisted of two alates and nine apterae. These were mounted on five slides by Essig, of these three were indicated as cotypes by Essig and two by Swain. We have not been able to locate the slides kept by Swain. Swain mentions other specimens taken by Essig. They are not in the Essig collection.

Cinara ferrisi (Swain)

Cinara chamberlini Knowlton New synonymy.

Alate viviparous female.

Length from vertex to end of anal plate varying from 4.29-5.07 mm. Width of head through the eyes about .886 mm. Length of antennal segments as follows: III 1.11-1.14 mm., IV .486-.514 mm., V .486-.529 mm., VI .143-.185 + .028-.057 mm. Secondary sensoria distributed as follows: III 13-17, IV 2-4 as rule four, V 1-2. The third antennal segment has the primary sensorium quite similar to the secondary, on this segment the secondary sensoria are large and are arranged in a straight row. The secondary sensoria are very tuberculate. On the side of the segment provided with sensoria there are almost no hair. Antennal hair fairly numerous inclined at an angle of about forty-five degrees. In length these hair vary from about .071-.085 mm. or at a ratio of 5-4 to the width of the segment. First and second antennal segments longer than normal, also with more numerous hairs. Median tubercle on head large. Eyes with well developed ocular tubercles. Head with median suture with a row of hairs on each side, adjacent area free from hair except at anterior margin, hair present median to eyes. Last three segments of the rostrum with the following lengths: .34, .24, .08 mm. sometimes reaching end of abdomen; sometimes extending only to end of cornicles. Prothorax with a partial median suture. Lateral lobes of thorax with hair on median portions, lateral portions free from hair. Median posterior lobe of thorax with many hairs. Forewings large, media with two branches, second branch closer to margin of wing than to first. Stigma extending rather far beyond origin of radial sector. Hind femora 2.93 mm. Hind tibiae 5.58 mm. Hair on hind tibiae numerous about .114 mm in length or about as long as the width of the segment, inclined at an angle of about forty-five degrees. Hair on inner and outer margins about the same in length, quality and number. Hind tarsal segments with the following lengths: .157 mm., .40 mm. First tarsal segment with about twenty-two hairs on the ventral surface. Mesosternal tubercle absent. Dorsum of abdomen with numerous hairs which vary from .10-.114 mm. in length. Base of cornicles about .347

mm. Cornicles rather high for width of base, the height being about .286 mm. Anal plate but little wider than cauda and about as long.

Apterous viviparous female.

Length from vertex to end of anal plate 4.36 mm. Width of head through the eyes 1.08 mm. Antennal segments with the following lengths: III 1.07 mm., IV .50 mm., V .429 mm., VI .157 + .042 mm. Secondary sensoria distributed as follows: III 7-8, IV 4, V 1. Primary sensoria on segments three and four similar to secondary, primary sensorium on fourth segment far removed from apex. On the third segment the sensoria are arranged in a straight row and are located on the apical half of the segment. Primary sensorium of fifth segment very large. Antennal hair similar to those of alate viviparous female. Rostrum reaching just to anterior portion of the cornicles, last three segments with the following lengths: .347, .24, .10 mm. Cornicles with base measuring .347 mm. in shape similar to those of alate viviparous female. Hind tibiae 5.58 mm. long. First segment of hind tarsis .17 mm., second segment of hind tarsis .28 mm. A mesosternal tubercle is present.

In his original description of this species, Swain mentions and lists *Lachnus abietis* Fitch as determined and reported by Davidson in 1909 and 1910, as a synonym of *Lachnus ferrisi*. Davidson's material can not be located. It is not in the collection of the National Museum, nor in the collections of the California Academy, or Stanford University. We have seen three slides of apterous viviparous females, determined as *ferrisi* taken by Ferris on *Abies cilicica* Oct. 21, 1916 at Stanford University. These slides are not indicated as cotypes, but may well have been seen by Swain, prior to the publication of the description of this species. The specimens on these slides are all *Cinara curvipes* (Patch). Therefore the possibility is quite strong that the *Lachnus abietis* Fitch as determined by Davidson, is *Cinara curvipes* (Patch). This supposition is further strengthened by the fact that *Cinara pilicornis* (Hartig) has not been reported from the Pacific Coast. Swain however, did not describe the apterous viviparous female of *ferrisi* from specimens of *curvipes*, but from material which agreed with the alate specimens he called *ferrisi*.

Wilson 1923 lists *Lachnus abietis* Fitch as a synonym of *Dilachnus pinicola* (Kaltenbach). Kaltenbach's species is a junior synonym of the species described by Hartig. Fitch's type is in the United States National Museum.

At our request Miss Louise M. Russell has kindly compared the Fitch type (viviparous females in poor condition), with specimens of *Cinara curvipes* and *Cinara pilicornis* and reports that the species described by Fitch is similar to *pilicornis*, but distinct from it. For this information full credit is due to Miss Russell.

Lectotype, alate viviparous female in the Essig collection. Morphotype apterous viviparous female in the Natural History Museum of Stanford University.

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PROCEEDINGS
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DESCRIPTION OF A NEW GENUS AND SPECIES OF APHIDAE

By F. C. Hottes

The species described herewith has been in my collection more than a quarter of a century. Through the years I have been awaiting the collection of alate viviparous specimens so that the generic status of the species could be definitely established. I have looked for it, without success, in Illinois where its host plant is common, for the past two years. Fellow entomologists have looked for it on the farm near Ames, Iowa where it was first taken, without finding it. Immature forms necessary for the placement in a genus following the system of Börner are not available. Rather than describe this new species in a known American genus and thus cover up it peculiar characters, a new genus is described for it.

Iowana New Genus Hottes

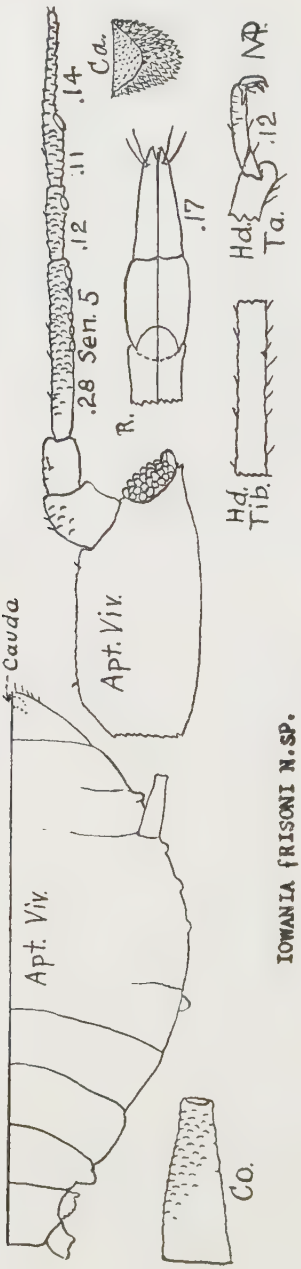
Head with frontal margin very broad and flat. Antennae five segmented. Prothorax with very large and broadly rounded lateral tubercles. Abdominal segments anterior to cornicles with large lateral tubercles. Abdominal segment posterior to cornicles with very large broadly rounded lateral tubercles. Cornicles almost truncate suggestive of the cornicles of *Macrosiphoniella* but not reticulated, without rim at apex, and about twice as long as width at base. Cauda broadly rounded slightly shorter than width at base, not constricted, suggestive of *Anuraphis*. Cauda not extending to end of abdomen. Anal plate but little differentiated from rest of abdomen, indicated only by better developed setulose surface provided with a few normal hair. Body hair very sparse, fine and short. This genus differs from *Cerosipha* Del Guerico in the shape and length of the cornicles, cauda, and little differentiated anal plate. From *Brachyunguis* Das, this genus differs in length of unguis, number of lateral tubercles, longer cornicles and much shorter cauda.

Genotype *Iowana frisoni* n. sp.

Iowana frisoni n. sp.

Apterous viviparous female.

Length from vertex to apex of abdomen 2.14 mm. Width of head through the eyes .34 mm. Color not known, most likely light green, uniform throughout, execpt for some brown on antennae and brown cornicles. Length of antennal segments as follows: III .27 mm., IV .114 mm., V .1 + .143 mm. First antennal segment very heavy with broad base. Antennal segments imbricated, the imbrications being heavy



IOWANIA FRISONI N.SP.

PLATE VIII

and well developed beyond the middle of the third segment. Third segment with five small secondary sensoria, arranged in a straight row and close together on apical half of segment. Primary sensoria present on segments three and four, primary sensorium on fifth segment without marginal sensoria. Hair on antennae almost absent, when present not much more than two times height of imbrications and very fine. Anterior margin of head very broad and flat, almost free from hair. Eyes small extending but little beyond side of body, rather flat, ocular tubercles present but small. Rostrum with fourth segment extending beyond coxae of metathoracic legs, apparently almost free from hair, last three segments of the following lengths: .128, .157, .014 mm. Lateral tubercles on prothorax very large, with broad base, broadly rounded. All tibiae short, length of hind tibiae .46 mm. All tibiae with very few hair, hair on outer margin almost absent, hair present, exceedingly short and fine. Hair on inner margin of hind tibiae less than .014 mm. in length, or about one third width of tibiae. First tarsal segment about .028 mm. in length, almost triangular in shape with two hairs in inner surface, this segment is inserted rather deeply within end of tibiae, so that the heel of the tibiae extends well beyond mid region. Second segment of tarsis .10 mm. in length. Surface of abdomen with very fine setulae except for region near apex where the setulae are very well developed. This region has a few fine hair of normal length, hair on rest of abdomen almost absent, where present very fine and extremely short. Cornicles .228 mm. in length, not much more than two times width at base, without rim at apex, surface of cornicles strongly imbricated. Cauda broadly rounded .10 mm. in length, not constricted failing to reach end of abdomen. Body apparently very flat. It is not known that the five segmented condition of the antennae is common to all generations.

The characters listed for the genus distinguish this species from other American forms.

Described from two apterous viviparous females taken on *Silphium laciniatum* (Rosin Weed, Compass Plant) in region of axial of leaf. Ames, Iowa, Aug. 25, 1925, G. Hendrickson Collector. Holotype deposited in collection of the United States National Museum.

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NOTES ON VENEZUELAN BIRDS AND DESCRIPTIONS OF SIX NEW SUBSPECIES

By William H. Phelps and William H. Phelps, Jr.

Besides describing six new subspecies of birds from our collection in Caracas, we record, in this paper, the extension to Venezuela and British Guiana of the ranges of several forms and discuss some taxonomic matters.

We thank the Curators of the collections in the American Museum of Natural History, U. S. National Museum, Chicago Natural History Museum, Museum of Comparative Zoology, Carnegie Museum, Philadelphia Academy of Natural Sciences and the British Museum for access to their collections for pertinent research and listing.

Specimens listed are in the Phelps Collection, Caracas, unless otherwise specified. Names of colors are capitalized when direct comparison has been made with Ridgway's "Color Standards and Color Nomenclature," 1912. Wing measurements are of the chord.

Calidris canutus rufus (Wilson)

Tringa rufa Wilson, Amer. Orn., 7, p. 43, pl. 57, 1813. (Middle Atlantic States=New Jersey.)

Sucre: 1 ♀, Cumaná. Collected by G. H. H. Tate, May 20, 1925. Specimen in the American Museum of Natural History.

This is the only record we can find of the occurrence of the species in Venezuela. It had not been published.

Otus aequatorialis venezuelanus, new subspecies

Type: From Cerro Pejochaina, alto Río Negro, Sierra de Perijá, Zulia, Venezuela; 1700 meters. No. 54498, Phelps Collection, Caracas. Adult male collected March 10, 1952, by Ramón Urbano. (Type on deposit at the American Museum of Natural History.)

Diagnosis: Differs (brown phase) from the type (brown phase) of *O. a. aequatorialis* Chapman and the only other known specimen, also in the brown phase, by being paler throughout, with much white on forehead, sides of head and throat, which is lacking in *aequatorialis*. Wings and lower back buffy whitish instead of dark buff. Wings shorter.

Range: Known from four specimens from the Perijá mountains: Cerro Pejochaina, Cerro Tutare and Cerro Jeretaca, in the Subtropical Zone at altitudes of 1700 and 1800 meters.

Description of type: Crown Cinnamon-Brown, the feathers broadly banded with blackish and more narrowly so with buffy which merges

into the buffy whitish forehead, which is dully barred with dusky; the prominent dusky eyebrows are buffy whitish, making the whole frontal aspect very white; a white partially concealed nuchal collar, the feathers narrowly barred with dusky; back any uropygium Tawney-Olive with fine dusky vermiculations; scapulars more whitish with brownish vermiculations and with many feathers largely white, except terminally, making large white visible spots on each side of back; superciliary region whitish barred finely with brown; sides of head buffy, barred with dusky. Throat buffy dully barred with brown, more whitish posteriorly; breast and sides buffy white with heavy dark brown shaft stripes and narrow light brown barring; abdomen and flanks strongly striped as the shaft stripes are more prominent, and the bars are faint and far apart; under tail-coverts, thighs and feathers of tarsi immaculate, pale buffy. Primaries and secondaries dusky brown barred with pale buff with vermiculated tips, paler on under surface; tertials vermiculated uniformly with scapulars; upper wing-coverts also uniform with scapulars except on the shoulders which are dusky with dark buff barring; bend of wing white with adjoining coverts with large visible buffy white areas; under wing-coverts and axillaries Clay Color with slight dusky speckling at bend of wing. Tail dusky brown banded with buff, more whitish on outermost remiges; tips of rectrices and all of two median ones entirely vermiculated.

Bill (in life) "greenish yellow"; feet "sulphur"; iris "rose-brown." Wing, 187 mm.; tail, 105; culmen from base, 25; tarsus, 30.

Remarks: Sexes alike in the rufous phase. Size similar to *aequatorialis* but with shorter wing. Range of measurements: three adult males—wing, 187-196 (190) mm.; tail, 99-103 (101); culmen from base, 25-25 (25); one adult female—wing, 190; tail, 105; culmen from base, 25.5. Measurements of *aequatorialis:* one adult male (type)—wing, 200, tail, 102; culmen from base, 24; one specimen of undetermined sex —wing, 202; tail, 98; culmen from base 26.

Description of female (54499) in rufous phase: above Amber Brown, paler on forehead, wings and rump; crown with some dusky shaft streaks and occiput with some faint dusky barring; faint dusky markings on back and uropygium; dusky barring and speckling on wings and tail; a few whitish visible feathers on scapulars; buffy white nuchal collar partially concealed. Sides of head and throat Amber Brown with some indistinct dusky barring; breast, sides and flanks buffy with brownish shaft streaks and barring, more whitish on abdomen; thighs, tarsi and under tail-coverts draker buff than in brown phase; under wing-coverts and axillaries as in brown phase but immaculate; under surface of wings and tail as in brown phase but barring a darker buff.

The reasons why we do not consider *O. aequatorialis* a subspecies of *O. albo-gularis*, as suggested might be the case by Peters,[1] are given in a previous paper "Eight New Birds and thirty-three Extensions of Ranges to Venezuela."[2]

Specimens Examined

O. a venezuelanus.—VENEZUELA: Cerro Pejochaina, 1 ♂ brown

[1] Bds. World, *4*, p. 108, 1940.
[2] Proc. Biol. Soc. Wash., *66*, pp. 125-146, Aug. 10, 1953.

(type); 1 ♀ rufous; Cerro Jeretaca, 1 ♂ rufous[3]; Cerro Tutare, 1 ♂ rufous.[3]

O. a. aequatorialis.—ECUADOR[4]: Ambato, 1 (?) brown (type); Río Sardinas, 1 ♂ brown.

Glaucidium brasilianum medianum Todd

Glaucidium brasilianum medianum Todd, Proc. Biol. Soc. Wash, *29*, p. 98, 1916. (Bonda, Santa Marta, Col.)

Hitherto the birds of the Tropical Zone of northern Venezuela have been called *G. b. phaloenoides* (Daudin), the type locality being Trinidad.

Comparison of 16 specimens in the American Museum of Natural History, 7 in the Carnegie Museum and 9 in the Phelps Collection, all in the brown phase, from the northern Venezuelan mainland, with 14 in the brown phase from Trinidad (*phaloenoides*) and 9 in the brown phase from Santa Marta (*medianum*) shows that those from Venezuela are *medianum* and not *phaloenoides.*

The Venezuelan specimens, in the brown phase, are decidedly different from those from Trinidad. The under parts are whiter with less and narrower striping. The upper parts are more grayish, less dark, rich brown. In the red phase they seem similar. They cannot be separated from the Santa Marta series either in the color of the upper parts, the streaking of the under parts or the barring on the rectrices.

Glyphorhynchus spirurus integratus Zimmer

Glyphorhynchus spirurus integratus Zimmer, Auk, *63*, p. 569, 1946. (Puerto Boyacá, Territorio Vasquez, Col.)

Zulia: 1 ♂, La Sierra, Perijá. Táchira: 2 ♂, La Fría; 1 ♂, Santo Domingo. Barinas: 1 ♀, Santa Bárbara.

The Perijá specimen was identified in 1943 as nearest to *G. s. sublestus* Peters. Later, in 1946, Zimmer (Auk, *63*, p. 569) described *integratus* from northeastern Colombia. Unfortunately, it is only now that we find that these specimens belong to the new race. In our "Lista de las Aves de Venezuela, etc.," (Soc. Ven. Cien. Nat., no. 75, 1950) we used the original identification of *sublestus* which Peters followed in his Check List of Birds of the World (*7*, p. 23, 1951).

This is an extension of range to Venezuela from northeastern Colombia.

Xenops rutilans perijanus, new subspecies

Type: From Cerro Pejochaina, alto Río Negro, Sierra de Perijá, Zulia, Venezuela; 1900 meters. No. 54765, Phelps Collection, Caracas. Adult male collected February 16, 1952, by Ramón Urbano. (Type on deposit at the American Museum of Natural History.)

Diagnosis: Differs from *X. r. heterurus* Cabanis and Heine by darker, more grayish olive, less brownish, under parts.

Range: The Perijá mountains from the Río Negro to the northernmost end at Cerro El Cedro, in the upper Tropical and Subtropical Zones from 450 to 2100 meters.

Description of type: Top of head duskier than Raw Umber, finely striped with pale buffy; back Argus Brown with dull stripes of buffy;

[3] Specimens in Pons Collection, Maracaibo.
[4] Specimens in American Museum of Natural History.

uropygium Amber Brown; lores grayish; prominent buffy white superciliary stripe; auricular region dusky brown; sub-ocular region mixed grayish and dusky. Chin and throat white; breast Light Brownish Olive merging into the Buffy Olive of abdomen and sides, more narrowly streaked with whitish; under tail coverts Sayal Brown; axillaries whitish. Wings Fuscous; five outermost primaries heavily margined with paler than Cinnamon Brown; remaining primaries, secondaries and outer tertials entirely Cinnamon Brown; under aspect of wing with wide median band of Light Ochraceous Buff except on two outer primaries; lesser wing-coverts extensively margined with Argus Brown; under wing-coverts Ochraceous Buff. Upper surface of tail Hazel, duller below; extensive black subterminal areas on the internal webs of the third, fourth, ninth and tenth rectrices.

Bill (in life) "black, base of mandible flesh"; feet "gray"; iris "brown." Wing, 66.5 mm.; tail, 48; exposed culmen, 12; culmen from base, 15; tarsus, 17.

Remarks: Sexes alike. Size similar to *heterurus*. Range of measurements: six adult males (incl. type)—wing, 65-68 (66.7) mm.; tail, 46-50 (48.5); culmen from base, 13-15 (14); three adult females—wing, 65.5-67 (66.2); tail, 47-49 (48); culmen from base, 14-14 (14). Measurements of *heterurus:* five adult males from Colombia—wing, 68-71 (69.4); five adult males from Venezuela—wing, 64-67 (65.2); tail, 45-46 (45.4); culmen from base, 13.5-14 (13.9); five adult females—wing, 61-65 (63.2); tail, 43-47 (45.4); culmen from base, 13-15 (13.9).

Specimens Examined

X. r. heterurus. COLOMBIA[4]: "Antioquia," 2 (♀); Anolaima, 1 (♀); Palo Hueco, 1 ♀; Cerro Munchique, 1 ♂; "Bogotá," 3 (♀); La Frijolera, 1 (♀); Río Toche, 2 ♀; Río Lima, 1 ♂; Fusugasuga, 1 ♂; Río Atrato, 1 (♀); Campo Alegre, 1 (♀); Trinidad, 2 ♂, 2 ♀, 1 (♀); La Tigrera, 1 ♂; Santa Elena, 2 ♂, 2 (♀); San Agustín, 1 (♀); San Antonio, 1 (♀); Salento, 2 (♀); east of Palmira, 1 ♂, 1 (♀); Los Tambos, 1 ♂; El Roble, 1 ♂, 1 ♀; Primavera, 1 ♀; Río Caqueta, 1 ♂, 1 ♀; Las Nubes, Santa Marta, 1 (♀). ECUADOR[4]: Baeza, 2 ♂, 2 ♀; Río Suno, 1 ♂, 1 ♀. VENEZUELA: Cubiro, 1 ♂; Quebrada Arriba, 1 ♂; Cerro El Cerrón, 1 (♀); Chirgua, 1 ♂; Las Trincheras, 1 ♂[4]; Cumbre de Valencia, 1 ♂[4]; Colonia Tovar, 1 ♀, 1 ♀[4]; El Junquito, 1 ♀; Los Caracas, 1 (♀); Hda. Izcaragua, Guarenas, 1 ♀; Cerro Negro, Miranda, 1 ♀; Turén, Portuguesa, 1 ♂; Calabozo, 1 ♂; Palenque, 1 ♀; Barcelona, 1 ♂, 1 ♀; Quebrada Bonita, Bergantín, 2 ♂, 1 ♀.

X. r. perijanus.—VENEZUELA: Cerro Pejochaina 2 ♂ (incl. type), 1 (♀); Cerro Yin-taina, 1 ♀; Cerro Mashirampé, 1 ♂, 1 (♀); Cerro Quirinchi, 1 ♀[3]; Barranquilla, 2 ♂, 2 ♀, 1 (♀); Cerro El Cedro, 1 (♀).

Thamnophilus punctatus interpositus Hartert and Goodson

Thamnophilus punctatus interpositus Hartert and Goodson, Nov. Zool., *24*, p. 496, 1917. ("Bogotá.")

Apure: 1 ♂, Guasdualito; 2 ♂, 3 ♀, La Victoria; 5 ♂, 3 ♀, Las Bonitas.

Barinas: 1 ♂, 2 ♀, Santa Bárbara; 2 ♂, 1 ♀, 2 (♀), Ciudad Bolivia; 1 ♂ juv., La Veguita; 1 ♂, 2 ♀ Barinitas.

These specimens extend the range of this subspecies from the llanos of the Meta River in Colombia to the upper Apure River region in Venezuela. They were compared with 14 specimens from Colombia in the American Museum of Natural History.

Terenura callinota venezuelana, new subspecies

Type: From Cerro Pejochaina, upper Río Negro, Sierra de Perijá, Zulia, Venezuela; 1900 meters. No. 54920, Phelps Collection, Caracas. Adult female collected February 19, 1952, by Ramón Urbano. (Type on deposit at the American Museum of Natural History.)

Diagnosis: The unique female differs from the female of *T. c. callinota* (Sclater) from Colombia and Ecuador in: nape and scapulars darker, olivaceous gray instead of bright olive; throat whiter, purer gray; abdomen paler yellow; lores more whitish, less buffy or brownish; wing band whiter; tail and bill longer.

Range: Known only from the type from the Subtropical Zone of the Perijá mountains at 1900 meters.

Description of type: Crown Brownish Olive; nape, scapulars and upper tail-coverts Grayish Olive; back (semi-concealed by scapulars) Sudan Brown; rump grayish, forming a narrow band; lores grayish white; superciliary stripe faintly whitish; ear-coverts grayish. Chin and throat white with a faint grayish cast, breast grayer; abdomen, flanks and under tail-coverts Massicot Yellow. Wings Fuscous; remiges, except outermost pair, edged finely with greenish gray; tertials tipped prominently with white; primary coverts lightly tipped with white; greater and lesser coverts heavily tipped with whitish forming two very prominent bands; bend of wing, under wing-coverts and axillaries Barium Yellow. Tail Benzo Brown; rectrices faintly edged with olivaceous except outer pair, and faintly tipped with whitish.

Bill (in life) "maxilla black, mandible gray"; feet "gray"; iris "dark." Wing, 55 mm.; tail, 48; exposed culmen, 14; culmen from base, 16; tarsus, 14.

Remarks: Size similar to *T.c. callinota* but tail and bill longer. Measurements of *T.c. callinota* from Colombia and Ecuador: three adult male from Colombia—wing, 51-54 (52) mm.; tail, 39-43 (41); culmen from base, 14-15 (14.4); eight adult females from Colombia (6) and Ecuador (2)—wing, 50-54 (52); tail, 39-46 (42.7); culmen from base, 14-15.5 (14.4). Measurements of *T.c. peruviana* de Schauensee: one adult male from Perú—wing, 55; tail, 44; culmen from base, 15.

Specimens Examined

T. c. venezuelana.—VENEZUELA: Cerro Pejochaina, 1 ♀ (type).

T. c. callinota.—COLOMBIA: Bitaco,[5] 2 ♂, 2 ♀; La Cumbre, Valle, 1 ♂, 2 ♀; Aguadita, 2 ♀.[4] ECUADOR[4]: Sabanilla, 1 ♀; Papallacta, 1 [♀].

T. c. peruviana.—PERU: Río Jelashte, 1 ♂.[6]

Percnostola leucostigma subplumbea (Sclater and Salvin)

Dysithamnus subplumbea Sclater and Salvin. Proc. Zool. Soc. London, p. 158, 1880. (Sarayacu, Ecuador.)

[5] Specimens in Carnegie Museum.
[6] Specimens in Museum of Comparative Zoology.

Táchira: 2 ♂, 5 ♀, Burgua.

These specimens extend the range of the subspecies from east of the eastern Andes of Colombia to Venezuela, in the extreme west of the Apure River watershed about 30 kilometers from the Colombian frontier, in the Tropical Zone. Comparison was made with 3 specimens from Colombia, 10 from Ecuador and 15 from Perú, all in the American Museum of Natural History.

Pyroderus scutatus granadensis (Lafresnaye)

Coracina granadensis Lafresnaye, Rev. Zool., *9*, p. 277, 1846. ("Nouvelle-Granade" = Bogotá.)

The following authors have called the race inhabiting the Coast Range of the Caracas region. *P. s. orenocensis* (Lafresnaye), confining *granadensis* to the Mérida region and Colombia: Hellmayr (Bds. Americas, etc., *6*, pp. 229-230, 1929), Zimmer (Am. Mus. Nov., no. 894, p. 26, 1936) and Phelps and Phelps Jr., (Lista Aves. Ven., etc., Bol. Soc. Ven. Cien., Nat., no. 75, p. 127, 1950). We cannot find that the Caracas region bird has ever been called *granadensis*.

Examination of the Lafresnaye types of *orenocensis* and *granadensis* in the Museum of Comparative Zoology reveals that *orenocensis* has immaculate chestnut breast and abdomen while *guianensis* has a black breast and abdomen, with buff spots.

Examination of specimens in the American Museum of Natural History, the British Museum and in our own collection shows that all true *orenocensis* specimens have immaculate chestnut breast and abdomen, while all *granadensis* specimens have these parts black, more or less spotted or blotched with chestnut. These characters are constant, always present.

The range of *orenocensis* is therefore confined to the Imataca mountains region of southeastern Venezuela and to British Guiana and Brazil, while *granadensis* inhabits the Caracas, Mérida and Perijá mountains in Venezuela and a part of Colombia.

Specimens Examined

P. s. granadensis.—COLOMBIA: "Bogotá," 5 ♂,[4] 3 ♀,[4] 1 (?),[7] 1 (?) (type),[6] 2 (?)[8]; Mascopán, Cauca, 2 ♂[7]; La Plata, Cauca, 1 ♂, 1 ♀[9]; La Candela, Huila, 2 ♂[9]; Tolima, 1 ♂[4]; San Augustín, 1 ♂[4]; La Palma, 1 ♂[4]; "Magdalena Valley," 2 (?)[10]; "E. Col.," 1 (?)[10]; "Colombia," 1 (?). VENEZUELA: La Sabana, Perijá, 1 ♂; Montañas Sierra, 1 (?)[10]; Carbonera, 1 (?)[10]; "Mérida," 1 (?),[10] 4 ♂[4]; Capáz, 1 ♀,[7] 3 ♂,[4] 3 ♀; Valle, 1 ♀[4]; Puerto Cabello, 1 (?)[10]; Cumbre Valencia, 1 ♂; Paso Hondo, (Pto. Cabello), 1 ♂[4]; El Bucaral, San Esteban, 1 ♀; La Sabana, 4 ♂, 6 ♀, 2 (?); Llano Rucio, 1 ♂, 1 ♀; Kunana, 1 ♂, 1 (?); Cerro Yin-Taina, 1 ♂, 1 ♀; Cerro Pejochaina, 1 ♂; Rancho Grande, 1 ♀.[11]

P. s. orenocensis.—VENEZUELA: Sierra de Imataca, 1 (?) (type)[6]; Altagracia (Upata), 1 ♂[4]; Guasipati, 5 (?); Upata, 1 (?)[12]; El Pal-

[7] Specimens in U. S. National Museum.
[8] Specimens in Chicago Natural History Museum.
[9] Specimens in Philadelphia Academy of Natural Sciences.
[10] Specimens in British Museum.
[11] Specimens in Estación Biológica de Rancho Grande, Venezuela.
[12] Specimens in Museo de Ciencias Naturales, Caracas.

mar, 1 ♀; Altiplanicie de Nuria, 1 ♂, 1 ♀; Cerro Tomasote, 1 ♂, 3 ♀; El Dorado, 1 ♂. BRITISH GUIANA: Cuyuni River, 1 (?)[10].

Tyrannus albogularis Burmeister

Tyrannus albogularis Burmeister, Syst. Ubers. Th. Bras., *2*, p. 465, 1856. (Minas Gerais, according to Pinto.)

1 ♂, Paruima Mission, Kamarang River, British Guiana. Collected by Pinkus on October 14.

October birds might be migrants but inasmuch as our two specimens from Santa Elena, on the Brazilian frontier eighty miles to the south, were collected on January 19, and presumably were residents, it is probable that this specimen was also a resident.

The Paruima Mission specimen now extends the range of the species to British Guiana. Previously it was known to the north of the Amazon only from the lower Rio Negro (Pinto, Cat. Aves Bras., *2*, 134, 1944) and also, by specimens in our collection, from Santa Elena, Bolívar, in southeastern Venezuela (Phelps and Phelps, Jr., Proc. Biol. Soc. Wash., 65, p. 93, 1952).

Platyrinchus mystaceus perijanus, new subspecies

Type: From Cerro Pejochaina, upper Río Negro, Sierra de Perijá, Zulia, Venezuela; 1800 meters. No. 55178, Phelps Collection, Caracas. Adult male collected February 19, 1952, by Ramón Urbano. (Type deposited at American Museum of Natural History.)

Diagnosis: Nearest to *P. m. neglectus* (Todd) of Colombia and Central America from which it differs by olivaceous instead of brownish upper parts.

Range: Known only from the Sierra de Perijá in the upper Tropical and Subtropical Zones at altitudes from 960 to 1800 meters.

Description of type: Upper parts greener than Saccardo's Olive; partly concealed large crown patch more lemon than Lemon Chrome; lores whitish; a buffy eye ring; maxillary stripe dusky; ear-coverts and sides of head mixed buffy and olivaceous. Chin and throat pure white bordered with pale buffy; breast, sides, flanks and thighs near to Buffy Citrine; abdomen Cream Color; under tail-coverts paler. Wings Benzo Brown; remiges narrowly edged with Orange-Citrine, more grayish on outermost ones; primary coverts and bastard quill dusky; greater and lesser wing-coverts faintly edged with Orange-Citrine forming two inconspicuous bands; bend of wing pale yellowish; under wing-coverts grayish; axillaries whitish. Tail Benzo Brown, upper surfaces of rectrices edged uniformly with back, except apically.

Bill (in life) "black, tip of mandible white"; feet "purplish gray"; iris "brown." Wing, 60 mm.; tail, 32; exposed culmen, 11; culmen from base, 14; tarsus, 18.

Remarks: Females have shorter wings and tail. Size similar to *neglectus*. Range of measurements: six adult males (including type)—wing, 60-60 (60) mm.; tail, 32-35 (34); culmen from base, 13.5-14.5 (14); four adult females—wing, 52-54 (53); tail, 27-28 (27.7); culmen from base, 13-14 (13.6). Measurements of *neglectus* from Colombia and Panamá: five adult males—wing, 57-62.5 (59.7); tail, 29-35 (31.6);

culmen from base, 14-15 (14.4); five adult females—wing, 50-55 (52.2); tail, 24-28 (26.5); culmen from base, 13-13.5 (13.2).

The color of the crown patch varies from the yellowest, the type, to more orange. As to the possibility of the prominence of the crown patch being sexual, our series is inconclusive as one female has the patch as large as any of the males, while one has it very weak and two have none at all, but these latter may be immature. All six males have the patch very prominent. Four males and one female have been sexed by the length of wings and tail, which is notably different.

Specimens Examined

P. m. mystaceus.[4]—BRAZIL: 20.[13]

P. m. bifasciatus.[4]—BRAZIL: 14.[13]

P. m. zamorae.[4]—PERU: 6.[13] ECUADOR: 11.[13]

P. m. albogularis.[4]—ECUADOR: 17.[13]

P. m. insularis.[4]—TOBAGO: 10.[4] TRINIDAD: 10.[4]. VENEZUELA: 17.[14]

P. m. imatacae.[4]—VENEZUELA: Cerro Tomasote, 1 ♂ (type. Phelps Coll.).

P. m. ptaritepui.[4]—VENEZUELA: Mt. Ptaritepui, 1 ♂ (type. Phelps Coll.).

P. m. duidae.[4]—VENEZUELA: 5.[13]

P. m. perijanus.—VENEZUELA: Cerro Pejochaina, 1 ♂ (type), 1 [♂]; Kunana, 1 [♀] Cerro Yin-taina, 1 ♀; La. Sabana, 1 [♀]; Barranquilla, 1 ♂, 3 [♂], 1 ♀.

P. m. neglectus.[4]—COSTA RICA: Cartago, 4 ♂; Sta. María de Dota, 1 ♀; Navarrito, 1 ♂; Bonilla, 1 ♂, 2 ♀; Aquinares, 2 ♀. PANAMA: Tacarcuna, 2 ♂, 1 ♀; Cerro Montoso, 2 ♂, 5 ♀; Boquerón, Chiriquí, 1 ♂; Boquete, 1 ♂, 1 ♀; Cerro Flores, 1 ♂; Chitra, Veraguas, 1 ♂, 5 ♀; Santa Fé, 2 ♂, 2 ♀. COLOMBIA: Las Lomitas, Cauca, 2 ♀; Río Frío, 1 ♂; La Palmira, 1 ♂; La Candela, Huila, 1 ♀; Primavera, W. Col., 1 ♀.

P. m. dilutus.[4]—COSTA RICA: 6.[13] NICARAGUA: 8.[13]

P. m. cancrominus.[4]—NICARAGUA: 8.[13] GUATEMALA: 9.[13]

Tyranniscus vilissimus tamae, new subspecies

Type: From Páramo de Tamá, Estado Táchira, Venezuela; 2400 meters. No. 11158, Phelps Collection, Caracas. Adult male collected February 23, 1941, by Enrique Riera. (Type on deposit at the American Museum of Natural History.)

Diagnosis: Nearest to *T. v. improbus* Sclater and Salvin of the Andes of Mérida but differs in darker, more dusky crown; lores and supercialiary stripe white, untinted with yellowish; breast grayer with less yellowish brown tinge; abdomen and under tail-coverts paler yellow.

Range: Páramo de Tamá, Sierra de Perijá and the Sierra de Santa Marta in Colombia, in the Subtropical Zone at altitudes from 1900 to 3000 meters.

Description of type: Crown dusky olive merging into the Dark Citrine

[13] For list of localities and specimens see Zimmer, Am. Mus. Nov., No. 1043, p. 8, 1939.

[14] For list of localities and specimens see Zimmer and Phelps, Am. Mus. Nov., No. 1274, p. 5, 1945.

of neck, back and uropygium; forehead, lores and eye ring white; auriculars brownish; subocular region mixed whitish and grayish. Chin and throat white; breast and sides Light Grayish Olive, slightly mixed with pale yellowish; abdomen, flanks, sides and under tail-coverts Straw Yellow. Wings Bone Brown X Natal Brown; primaries except outermost, and inner ones, finely margined externally with yellowish white; tertials heavily margined with Citron Yellow; inner margins of remiges whitish, increasingly so inwardly; primary coverts brownish; greater and median coverts margined heavily with Straw Yellow, giving a streaked appearance, not banded; lesser coverts edged with greenish; bend of wing Citron Yellow; under wing-coverts pale yellowish and dusky; axillaries yellowish white. Tail Benzo Brown; rectrices edged with greenish except the outer pair, and very faintly tipped except the median ones with grayish; under surface paler.

Bill (in life) "black"; feet "gray"; iris "brown." Wing, 62 mm.; tail, 51; exposed culmen, 9; culmen from base, 12; tarsus, 18.

Remarks: Females have shorter wings and tail. Size similar to *improbus*. Range of measurements: five adult males from Páramo de Tamá region—wing, 60-62 (61.2) mm.; tail, 49-52 (50.6); culmen from base, 12-12 (12); two adult males from Perijá—wing, 58-59 (58.5); tail, 48-51 (49.5); culmen from base, 11.5-12 (11.7); two adult males from Santa Marta, Colombia—wing 61.5-62 (61.7); tail, 51-51(51); culmen from base (1), 12; one adult female from Páramo de Tamá region—wing, 57; tail, 46; culmen from base, 12; one adult female from Perijá—wing, 53; tail, 42; culmen from base, 11; one specimen of undetermined sex from Páramo de Tamá region—wing, 58.5; tail, 49; culmen from base, 12. Measurements of *improbus* of the Mérida region: five adult males—wing, 59-62 (59.6); tail, 50-51 (50.2); culmen from base, 11-12 (11.5); five adult females—wing, 53-55 (54.2); tail, 44-46 (45); culmen from base, 11-12 (11.3).

Of the four specimens from Santa Marta, two have the greener crowns of *improbus* and two the duskier ones of the new Tamá-Perijá race, but all of them resemble the new form in the white lores and superciliary stripes, grayer breast and paler yellow abdomen. They are thus not typical but closer to the new form.

Specimens Examined

T. v. vilissimus.—GUATEMALA[4]: Finca Sepecinte, 2 ♂, 2 ♀; Secanquim, 4 ♂, 3 ♀; Volcán de Fuego, 1 (?); Quesaltenango, 1 ♀; Barrillos, 1 ♀; Carolina, 1 ♀; "Guatemala," 2 (?).

T. v. parvus.[4]—NICARAGUA: Los Sabalos, 1 ♂; Chontales, 1 ♂. COSTA RICA: Atlanta, 2 ♂; La Hondura, 1 ♀; Tuis de Turrialba, 1 ♂, 1 ♀; Aquinares, 2 ♂; Navarrito, 1 ♂; Meleradilla Azuya, 1 ♂; Azuhar, 1 ♀; Sta. María de Dota, 2 ♂, 1 ♀; Guapiles, 1 ♂, 1 ♀; Beruca, 2 ♂, 2 ♀, 1 (?); Navarro, 1 ♂; Agua Caliente, 1 ♂, 1 ♀; Buenos Aires, 1 ♂; Siguieres, 1 ♀. PANAMA: Boquerón, 2 ♂, 1 ♀; Boquete, 1 ♂, 1 ♀; Bojava, 1 ♂; Santa Fé, 5 ♀; Wilcox Camp, 1 ♀; Cerro Monotoso, 2 ♂; Almirante, 1 ♂, 1 ♀; La Chorrera, 1 ♂; Chepigana, 1 ♀; Tacarcuna, 3 ♂.

T. v. tamae.—VENEZUELA: Páramo de Tamá (camp), 3 ♂ (incl. type); Villa Páez, 1 ♂, 1 ♀, 1 (?); Las Delicias, 1 ♂; Cerro Yin-

taina, Perijá, 1 ♂; Cerro Jurustaca, 1 ♀; Cerro Mashirampé, 1 ♂. COLOMBIA: Valparaíso, Santa Marta,[4] 2 ♂, 2 (?).

T. v. improbus.—VENEZUELA: Páramo El Escorial,[4] 2 ♂, 3 ♀, 3 (?); Páramo La Culata,[4] 1 ♀, 1 (?); Valle, 3 ♂, 2 ♀, 1 (?); "Mérida," 2 (?)[4]; Páramo Zumbador, 1 ♂; Queniquea, 1 ♂, 2 ♀; Boca de Monte, 1 ♂, 1 ♀, 1 (?); Seboruco, 2 ♂; Valle, 4 ♂, 2 ♀, 1 (?)ffi Páramo La Culata, 1 ♂, 3 ♀; Pedregoza, 1 ♂; Conejos, 1 ♂; San Fausto, 1 ♂; Río Chama, 1 ♂; Quintero, 1 ♀; Altamira, Barinas, 2 ♂, 1 ♀, 1 (?).

T. v. petersi.—VENEZUELA: Las Quiguas, 1 ♀[4]; Cumbre Chiquita, 1 ♂[4]; Galipán, 4 ♂[4]; Loma Redonda, 2 ♂[4]; La Victoria, 1 ♀[4]; Colonia Tovar, 1 (?); Cubiro, 1 ♀; Ño León, 1 (?); El Junquito, 1 ♀; Guarenas, 1 ♂, 1 ♀; San Joaquín, 1 ♂; Cerro Golfo Triste, 1 ♀; Cerro Negro, Miranda, 1 ♀.

Coereba flaveola melanornis, new subspecies

Type: From the island of Cayo Sal, opposite to Chichiriviche, Estado Falcón, Venezuela; at sea level. No. 58393, Phelps Collection, Caracas. Adult male collected August 22, 1953, by W. H. Phelps Jr. (Type on deposit at the American Museum of Natural History.)

Diagnosis: It has the nearly all black color of *C. f. laurae* Lowe of Los Testigos islands but differs in having the smaller bill and shorter wing of *C. f. lowii* Cory of Los Roques islands; from *C. f. lowii* differs by having the nearly all black instead of the olivaceous black color, and by shorter wing.

Range: Known only from Cayo Sal, a small island about three quarters of a mile long and situated less than that distance from the mainland.

Description of type: Upper parts uniformly black with a slight olivaceous tint on the rump; throat, breast, under wing-coverts, axillaries and thighs black; sides, abdomen and under tail-coverts tinted with olivaceous; under surface of tail dusky. Inner webs of remiges narrowly edged with grayish, more basally on external ones.

Bill (in life) "black"; feet "grayish black"; iris "dark." Wing, 57 mm.; tail, 35; exposed culmen, 12; culmen from base, 14; tarsus, 17.

Remarks: Sexes alike in color; male has longer wing. Range of measurements: one adult male (type), see above; one adult female—wing, 53 mm.; tail, 34; culmen from base, 14; four adults of undetermined sex—wing, 51-58 (53.2); tail, 32-33 (32.7); culmen from base, 14-14 (14). Measurements of *laurae:* five adult males—wing, 60-63 (61.4); tail, 39-44 (41.3); culmen from base, 17-18 (17.8); three adult females—55-56 (55.7); tail, 34-35 (34.3); culmen from base, 17-17 (17). Measurements of *lowii:* five adult males—wing, 58-61 (57.5); tail, 37-39 (38.2); culmen from base, 14-15 (14.8); five adult females—wing, 53-55 (54.6); tail, 34-36 (34.8); culmen from base, 13-14 (13.8).

The known range of this additional black race is not more than half of a square mile because about half of the island is taken up by a large circular lagoon. Borracho island, another smaller mangrove key, one and three quarter miles to the northeast, was collected but the species was not found there; nor was it found on Cayo Los Muertos, a quarter of a mile long and a little more than half a mile to the south;

nor on Cayo del Norte, half a mile long and fourteen miles east of south. The adjacent mainland was not visited but that area is in the range of *C. f. luteola* (Cabanis). If really confined to this small key, the population must be exceedingly small. We believe it of interest to note that the collector thinks he saw one normal colored individual on the island.

Specimens Examined

C. f. lowii.—VENEZUELA: Islas Los Roques, 6 ♂, 8 ♀, 2 (?), 2 juv. (?).

C. f. melanornis.—VENEZUELA: Isla Cayo Sal, 1 ♂ (type), 1 ♂ juv., 1 ♀, 3 (?).

C. f. laurae.—VENEZUELA: Islas Los Testigos, 9 ♂, 4 ♀, 2 ♀ juv., 2 (?).

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PROCEEDINGS
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CATALOGUE AND NOTES ON THE GASTROPOD GENUS BUSYCON*

By Elton L. Puffer[1] and William K. Emerson[2]

INTRODUCTION

The busycons or "whelks" have long attracted the interest of American workers because of their ponderous size and abundance in the eastern American Cenozoic faunas. The first attempt to monograph the group was by Conrad in 1854. A number of other workers have undertaken phylogenetic and taxonomic studies of the genus. Prominent among these are Gill (1867), Conrad (1867), Dall (1890), B. Smith (1902; 1914), Grabau (1903; 1907), Wade (1917), and Gardner (1944; 1948). Though considerable data have appeared in the literature, no comprehensive catalogue of the genus has been compiled in nearly one hundred years. The primary purpose of this paper is to enumerate the several supraspecific and the numerous specific-infraspecific names which have been referred to the genus *Busycon (sensu lato)*. It is hoped that this catalogue will be of some aid in the interpretation of the rather complex nomenclatural history which confronts students of the group.

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GENERAL NOTES PERTAINING TO THE GENUS

Geologic History.—The group is confined in its fossil and natural Recent distribution to the Western Atlantic coast. A major controlling factor in the limited distribution of the genus may be the lack of an active

*Contribution from the Museum of Paleontology, University of California, Berkeley.

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free-swimming larval stage which is explained by the loss of the velum before the animal emerges from the egg-capsule.

Available data would indicate that the ancestral stock probably originated in the Cretaceous of eastern America as small, thin-shelled species. Though the early Tertiary record is uncertain, by mid-Miocene time the group had gradually evolved into many large, heavy-shelled species. Having attained an apparent acme in the Miocene of the middle Atlantic states, the genus declined in number of species in the Pliocene and is represented in the Quaternary by a few, but very conspicuous species.

The presence of the non-canaliculate species, *Busycon spiniger* (Conrad, 1848) in the Red Bluff formation (Lower Oligocene) of Mississippi and *B. nodulatum* (Conrad, 1849) in the Vicksburg group (Middle Oligocene), indicates that *Busycon* (*sensu stricto*) was well defined by the beginning of the Oligocene. By mid-Miocene time the *Sycotypus* [=*Busycotypus*] line of descent, in which the whorls became separated by a deep canaliculate suture, had become established. This morphologic character remains fixed in the species comprising this branch of development, with only an occasional reversion to a weakly developed sutural canal.

Wade (1917:293) commented that our knowledge of the pre-Oligocene history of the busycons "seems to be in a chaotic state"; unfortunately this situation remains essentially unaltered at this date. Grabau (1903) questioned the existence of the genus in the Eocene. However, Dall (1890:109) believed that the group had assumed its characteristic shell features before the close of the Eocene and that the genus first appeared in that epoch. Both Dall (1890:117) and Harris (1895:70) were of the opinion that the busycons originated from the *Levifusus*-complex. Maury (1909:335) described *Levifusus fulguriparens* from the Jackson formation (Upper Eocene) of Louisiana and considered it to link *Levifusus* with *Busycon spiniger* (Conrad, 1848), which is known to occur in the Red Bluff clay (Lower Oligocene) of Mississippi. The species included in *Levifusus sensu stricto*, especially the genotype from the Midway (Paleocene), the Wilcox (Eocene), and the Claiborne (Eocene), resemble in general form a small busycon, but, unlike the "true" busycons, possess a second angulation on the body whorl; in the Busyconinae the protoconch appears to be the primary indicator of natural relationships (cf. B. Smith, 1945:14). It seems probable that the general morphologic features common to *Levifusus* and *Busycon* may be due to convergence rather than to a close relationship. Inasmuch as the genus is well defined by early Oligocene time, the scarcity of early Tertiary data pertaining to the group is a perplexing problem.

The discovery by Wade (1917) of a busycon-like gastropod in the Ripley formation (Upper Cretaceous) of Tennessee further complicated the interpretation of the early history of the group. He proposed, with *Busycon cretaceum* as the type species, the subgenus *Protobusycon*, differentiating it from *Busycon sensu stricto* by the possession of a shallow sulcus at the base of the body whorl. Unfortunately, the proto-

conch of the unique specimen upon which the subgenus is based was not preserved. Wade (1917:296) believed that *B. cretaceum* could be favorably compared in gross morphologic aspects with *B. carica* (Gmelin, 1790), the type species of *Busycon,* but noted that a basal sulcus is not developed in any of the Cenozoic representatives of the genus. Stephenson (1941:324) recorded a large gastropod similar to *B. cretaceum* Wade from the Nacatoch sand of the Navarro group (Upper Cretaceous) of Texas. Though Stephenson's material was based on incomplete internal and external molds, there is no indication of a spiral sulcus at the base of the body whorl. He postulated that the presence of the basal sulcus in Wade's lone specimen may be a pathologic feature caused possibly by an injury to the mantle.

Harris (1896:96) described *''Fulgur? dallianum''* from the Midway formation (Paleocene) of Alabama on the basis of a single fragment. This record, together with specimens of the apical portions of a gastropod recorded by Gardner (1933:226) from the Midway of Texas may possibly represent species referable to the subgenus *Protobusycon.* However, these Paleocene records are based upon such meager and poorly preserved material that they cannot be definitely allocated to *Protobusycon.* Until additional specimens of *B. cretaceum* and its allies are obtained, it seems advisable to place *Protobusycon* in the category *''incerta sedis.''* Following Wade (1917) and Wenz (1943) the authors have questionably referred *Protobusycon* to *Busycon sensu lato.*

Ecologic considerations.—Though a number of short papers on the natural history of these gastropods have appeared, the recent contribution of Magalhaes (1948) is the most valuable single source for neoecological data and includes a lengthy bibliography.

The busycons are most commonly reported from the intertidal zone. There is a surprising paucity of bathymetric records for these gastropods. The available data would indicate the maximum offshore habitat to be in the eulittoral zone (0-50 meters) of the benthic system. Although *B. spiratum* (Lamarck, 1816) is recorded from 50 fathoms (Dall, 1903), the occurence of the genus in the sublittoral zone (outer neritic) would appear to be rare.

Being carnivorous, these conchs may be expected to frequent a variety of bottom types. Though the busycons are recorded from substrates ranging from rock and shell to sand and mud bottoms, they appear to be found most commonly on the finer clastic sediments in which pelecypods, one of their main sources of food, are abundant.

Distribution.—In its Recent distribution, the genus *Busycon* is known to range southward along the coastline from Cape Cod, Massachusetts to the Gulf of Campeche, Mexico, it is also known to occur in some of the northerly islands of the West Indies. It should be noted at this time that *Busycon canaliculatus* (Linné, 1758) has been introduced[3] inadvertedly to San Francisco Bay, California (Calif. Acad. Sci. Dept. Geol. loc. no. 29077) probably by the activities of man through the importation of Atlantic oysters and oyster spat.

[3]Hertlein, L. G. (personal communication)

REVIEW OF CLASSIFICATION

Subfamily BUSYCONINAE[4]

Genus Busycon 'BOLTEN' RÖDING, 1798

Busycon 'BOLTEN' RÖDING, 1798, Museum Boltenianum, pt. 2, p. 149; *Busycum* "BOLT[EN]" MÖRCH, 1852, Cat. Conch. Yoldi, vol. 1, p. 104; *Busicon* "CON[RAD]" EMMONS, 1858, Rept. North Carolina Geol. Surv., p. 248.

TYPE SPECIES: *Murex carica* GMELIN, 1790 = *Busycon carica* (GMELIN, 1790) [by subsequent designation, B. SMITH, 1938:20].

GEOLOGIC RANGE: [?Upper Cretaceous] Oligocene to Recent.

DIAGNOSTIC CHARACTERS: Shell large or medium sized, pyriform, thin to heavy; spire short, terminating in a paucispiral, papillate nucleus; body whorl large, inflated; columella long, slender with a single, somewhat obsolete fold; spiral sculpture usually developed; axial sculpture expressed by growth lines and resting stages, often tuberculate or spinose upon the periphery of the whorls; anterior canal long, open, somewhat recurved; posterior canal lacking; outer lip smooth or lirate; operculum ovate, with apical nucleus; periostracum, thin, simple, or hirsuted.

REMARKS: B. SMITH (1938) has made a critical and apparently exhaustive study of the involved type designation for this genus. He concludes that none of the previous designations are valid, selecting *Busycon carica* (GMELIN, 1790) as the type species. Although this designation appears to be valid, the designation of *Busycon muricatum* 'BOLTEN' RÖDING, 1798 [= *Murex carica* GMELIN, 1790] as the type species would have been in strict adherence to the Règles.

Post-Eocene species of the genus may be conveniently assigned to either *Busycon s. s.* or to *Busycotypus* depending upon the suture type. The development of a canaliculate suture appears to be a morphologic feature in the *Busycotypus*-complex representing a natural line of descent. Phylogenetic studies of the genus indicate the presence of several apparently definable bio-temporal species groups within the two major evolutionary branches of the genus. At this time, it seems advisable to regard the subgeneric names, which have thus far been proposed for these species groups, as "Sections", and thus retain the generally accepted two-fold classification of the genus. Otherwise it would be necessary to raise the presently recognized subgenera to full generic status and in turn name and treat the several species groups as sub-generic units. The erection of formal names for the several currently un-named species groups is beyond the scope of this paper.

Subgenus *Busycon* (*sensu stricto*)

Fulgur DENYS DE MONTFORT, 1810, Conch. Syst., vol 2, p. 502, type species: *Fulgur eliceans* DENYS DE MONTFORT, 1810 = *Busy-*

[4]Following the erection of the genus *Fulgur* by DENYS DE MONTFORT (1810), the family assignment of the group suffered many vicissitudes as indicated by the following allocations: Fasciolariidae (H. ADAMS and A. ADAMS, 1853; DALL, 1890). Buccinidae (TRYON, 1883), Fusidae (ZITTEL, 1881-1885); Turbinellidae (FISCHER, 1884), Galeodidae (THIELE, 1931; WENZ, 1943), Neptuneidae (JOHNSON, 1934), Xancidae (DAVIES, 1935). GRABAU and SHIMER (1909) elevated the group to full family status, Fulguridae [=Busyconidae]; however, most American workers now recognize the group as a subfamily, Busyconinae.

con eliceans (DENYS DE MONTFORT, 1810) [by original designation]; *Fulgus* "MONTF[ORT]" DESMAREST [in] CHENU, 1856, Encyclop. Hist. Nat., Crust. Moll. Zoolph., p. 179.

Sycopsis CONRAD, 1867, Am. Jour. Conch., vol. 3, p. 184, type species: *Fulgur tuberculatus* CONRAD, 1840 = *Busycon tuberculatum* (CONRAD, 1840) [by subsequent designation, EMERSON, 1953:64].

Echinofulgar OLSSON and HARBISON, 1953, Acad. Nat. Sci. Phila., monogr. no. 8, p. 212, type species: *Fulgar echinatum* DALL, 1890 = *Busycon echinatum* (DALL, 1890) [by original designation].

TYPE SPECIES: *Murex carica* GMELIN, 1790 = *Busycon carica* (GMELIN, 1790) [by subsequent designation, B. SMITH, 1938:261.

GEOLOGIC RANGE: [?Eocene], Oligocene to Recent.

DIAGNOSTIC CHARACTERS: Shell large to very large; axial sculpture typically spinose or tuberculate on the periphery of the whorls, rarely with a second row of smaller spines on the body whorl; whorls not separated by canaliculate suture; periostracum simple, not ciliated; radular dentation: rhachidian tooth 5-6 dentate, laterals 5-6 dentate, *fide STIMPSON* (1865:61).

Section *Echinofulgar* OLSSON and HARBISON, 1953

REMARKS: Characterized by the development of a second row of reduced spines below the primary row on the periphery of the whorl, as in the type species, *B. echinatum* (DALL, 1890). OLSSON and HARBISON (1953:212) point out the striking resemblance of this sepcies to some Eocene species of *Levifusus*, particularly *L. branneri* HARRIS, 1896; this probably represents convergence. HACKNEY 1944) and MAGALHAES (1948) state that a second row of spines rarely occurs in Recent specimens of *B. carica* (GMELIN, 1790); similarly, B. SMITH (1944) reports that a second row of spines is rare on *B. contrarium* (CONRAD, 1840); this phenomenon has been noted in a Miocene specimen of *B. contrarium* from North Carolina and a Pleistocene specimen of *B. carica* from North Carolina (SMITH, B., 1943:4, 5). However, unlike *B. echinatum*, the second row of spines appears above the shoulder angle. MAGALHAES (1948:385), on the basis of population studies of *B. carica* from near Beaufort, North Carolina, estimates that this abnormality is manifested in one individual in every three hundred specimens.

Subgenus *Busycotypus* WENZ, 1943

Sycotypus "BROWNE" GILL, 1867, Am. Jour. Conch., vol 3, p. 147, type species: *Murex canaliculatus* (LINNÉ, 1758) = *Sycotypus canaliculatus* (LINNÉ, 1758) = *Busycon canaliculatum* (LINNÉ, 1758) [by original designation]; *Sycotopus* CONRAD, 1855, U. S. House of Representatives Doc. no. 129, p. 19; *Syctopus* CONRAD, 1857, Rept. Explor. Surv. Pacific R.R., vol. 5, pt. 2, App. art. 2, pp. 319, 329; *Sycotyphus* CONRAD, 1865, Am. Jour. Conch., vol. 1, p. 151 [all of CONRAD'S citations are errors for/or emendations of *Sycotypus* "BROWNE" GILL, 1867]. Not *Sycotypus* MÖRCH, 1852, Cat. Conch. Yoldi, vol. 1, p. 110.

Busycotypus WENZ, 1943, Handb. Paläzool., vol. 6, Gastropoda, div. 6, pt. 8, p. 1219, [new name for *Sycotypus* GILL, 1867, not MÖRCH, 1852.].

Fulguropsis MARKS, 1950, Nautilus, vol. 64, no. 1, p. 34, type species: *Bulla pyrum* DILLWYN, 1817 = *Busycon spiratum* (LAMARCK, 1816) [by original designation; new subgenus replacing "*Sycotypus* GILL, 1867, not GRAY, 1847"].

Sycofulgar MARKS, 1950, Nautilus, vol. 64, no. 1, p. 34, type species: *Fulgur rugosus* CONRAD, 1843 = *Busycon rugosum* (CONRAD, 1843) [by original designation].

TYPE SPECIES: *Murex canaliculatus* LINNÉ, 1758 = *Busycon canaliculatum* (LINNÉ, 1758).

GEOLOGIC RANGE: Miocene to Recent.

DIAGNOSTIC CHARACTERS: Shell large to very large; whorls separated by deep canaliculate suture; axial sculpture typically tuberculate in juveniles, uniting, in senility, to form rounded or keeled shoulders on the periphery of the whorls; periostracum ciliated; radular dentation: rhachidian tooth 3 dentate, laterals 4-5 dentate, *fide* STIMPSON, (1865:60).

REMARKS: *Sycotypus* is often ascribed to BROWNE (1756:406) *Civil and Natural History of Jamaica*, a pre-Linnaean work which was reprinted in 1789. GILL (1867:147) maintained that BROWNE'S reference to "the smaller, hairy fig-shell" applied to *B. canaliculatum* (LINNÉ, 1758), a species not known to occur in Jamaica; however, GRAY (1847:135) referred *Sycotypus* to *Pyrula* [= *Ficus*], which does not possess a hairy epdiermis. As pointed out by GARDNER (1944:457) this problem is purely academic as BROWNE'S names are not available. GRAY (1847:135) listed "*Sycotypus* BROWNE, 1756" in the synonymy of *Pyrula* of LAMARCK without definitely indicating acceptance of the name. MÖRCH (1852:110) validated *Sycotypus* and applied the name to *Ficus* 'BOLTEN' RÖDING, 1798. Unfortunately, *Sycotypus* was not available when GILL designated *B. canaliculatum* the type species and described the genus. *Busycotypus* must, therefore, be applied to the *Sycotypus* group.

Sycofulgur was proposed by MARKS (1950:34) for *B. rugosum* and differentiated from *Busycotypus* by "having nodes on its shell throughout its growth." Under the present classification of the genus, *Sycofulgur* does not appear to warrant even sectional recognition as a higher nomenclatural category.

? Subgenus *Protobusycon* WADE, 1917

Protobusycon WADE, 1917, Am. Jour. Sci., ser. 4, vol. 43, p. 295; COSSMANN, 1917, Rev. Critique Páleozool., Année 20, no. 3, p. 100; WADE, 1926, U. S. Geol. Surv., Prof. Paper 137, p. 136.

TYPE SPECIES: *Busycon cretaceum* WADE, 1917 [by monotypy].

GEOLOGIC RANGE: Upper Cretaceous [Ripley formation, McNairy County, Tennessee (Senonian)].

DIAGNOSTIC CHARACTERS: Shell small for genus; character of protoconch unknown; axial sculpture restricted to low, sub-spinose nodules upon periphery of the whorls; a secondary keel outlines base of body whorl, keel beset with 4-5 obsolete spines; shallow sulcus at base of body whorl, terminating as a slight projection at the margin of the inner lip.

REMARKS: The questionable status of this unit is discussed in the section pertaining to the geologic history of the subfamily, see p. 117.

CATALOGUE OF SPECIFIC AND INFRA-SPECIFIC NAMES IN THE BUSYCONINAE

Introduction.—This catalogue is the result of an exhaustive search of the literature and is a compilation of the specific and infra-specific names which have been referred to *Busycon* (*sensu lato*). A total of 107 trivial names were found to have been allocated to the genus; of this number, 76 are referable to the genus, 19 were erroneously placed in/or assigned to the genus, 6 are nude names, 2 are errors for/or emendations of valid names, 2 are questionably retained in the genus by the authors, 1 is preoccupied but is a junior synonym of a valid name, 1 is listed as "sp."

A review of the type localities for the 76 names which can be definitely allocated to the genus indicates the following age assignments: Oligocene 2, Miocene 42, Pliocene 12, Recent 17; 3 are from questionable or unknown type localities. Of this total, 54 names were proposed by four authors, namely: Conrad (28), Gardner (12), Dall (8) and Mansfield (6).

Procedure and methods.—In the catalogue below, the following format is used, the trivial names are listed alphabetically with the exact orthography used by the original author and followed by: the initial generic assignment in brackets, reference to the original description and references to figured specimens, the type locality, additional records of occurrence, and remarks which are largely derived from the literature. Junior synonyms are compiled from the literature as are "varieties," which include all specific and infra-specific names that have been described and assigned by the original author or have been subsequently referred to as varieties and subspecies of a specific name. The résumé is a brief review of all senior and junior synonyms, based upon the literature. Names which are preceded by an asterisk (*) were erroneously placed by the original author or reassigned by a subsequent author to the genus *Busycon* (*sensu lato*); in cases of subsequent reassignment, the first author to erroneously place a trivial name in the Busyconinae is cited first whether he be the original author of the species or a subsequent revisor.

adversarium [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, pp. 560, 584; 1867, Am. Jour. Conch., vol. 3, pp. 184, 185 [as *Busycon*].

TYPE LOCALITY: Pliocene ?—Godfrey's Ferry, Pee Dee River, Horry County, South Carolina; "Smith's, Goose Creek" = "The Plantation of the Late Geo. Henry Smith, Esq.; . . .", South Carolina (Tuomey and Holmes, 1857:xi).

REMARKS: Conrad (1863:584) did not describe this species but referred his name *adversarium* to *B. perversum* Tuomey and Holmes, 1857, Pleioc. fossils So. Car., pp. 145-146, pl. 29, fig. 3 [not fig. 2], not *B. perversus* (Linné, 1758). Conrad's (1863:584 [not p. 560]) *carolinense*, [not *carolinensis* Tuomey and Holmes (1857)], = *adversarium* Conrad (1863) as both species are based on the same figure of Tuomey and Holmes (1857: pl. 29, fig. 3). B. Smith (1939:26) con-

siders this species to represent a fairly mature example of *contrarius* Conrad (1840).

JUNIOR SYNONYM: *carolinense* Conrad (1863: 584 [not p. 560]).

RÉSUMÉ: *contrarius* Conrad (1840) = ? *gibbosum* Conrad (1854) = *adversarium* Conrad (1863) = *carolinense* Conrad (1863:584 [not p. 560]).

aepynotum [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, pp. 113-114; Mansfield, 1930, Florida Geol. Surv., Bull. no. 3, p. 69, pl. 8, figs. 1, 6 [as *Busycon*].

TYPE LOCALITY: Upper Miocene—Choctawhatchee formation [*Ecphora* zone]: upper bed at Alum Bluff, Liberty County, Florida (Dall, 1890:113-114) and (Mansfield, 1930:69).

REMARKS: Dall (1890:113-114) considered this species to be a variety of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].

affine [*Busycon*] Sowerby, H. Adams and A. Adams, 1853, Gen. Recent Moll., vol. 1, p. 151 [*nomen nudum*].

REMARKS: H. Adams and A. Adams (1853:151) placed this name in the genus *Busycon.* Tryon (1881:232) stated "*Busycon affine* Sowerby" H. Adams and A. Adams (1853:151) "was not published."

**africanus* [*Fulgur*] Sowerby, 1897, Marine Shells of South Africa, App. p. 1, pl. 6, fig. 19 [not seen].

TYPE LOCALITY: Recent—Port Elizabeth, Cape of Good Hope, Union of South Africa (Smith, E. A., 1903, Proc. Malac. Soc. London, vol. 5, p. 368).

REMARKS: Not a *Busycon;* a species of *Fusus* erroneously placed in *Fulgur* (Smith, E. A., 1903, Proc. Malac. Soc. London, vol. 5, p. 368).

aldrichi [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, p. 450, pl. 49, figs. 11, 12.

TYPE LOCALITY: Middle Miocene—Shoal River formation, Alum Bluff group: Crowder's Crossing, ½ mile below Shell Bluff, Shoal River, Walton County, Florida (Gardner, 1944:450).

OCCURRENCE: Middle Miocene—Shoal River formation, Alum Bluff group 1½ miles below Shell Bluff, Shoal River, Walton County, Florida (Gardner, 1944:450).

alumense [*Busycon*] Mansfield, 1930, Florida Geol. Surv., Bull. no. 3, p. 66, pl. 7, figs. 3, 4.

TYPE LOCALITY: Upper Miocene—Choctawhatchee formation [*Ecphora* zone]: upper bed at Alum Bluff, Liberty County, Florida (Mansfield, 1930:66).

OCCURRENCE: Upper Miocene—Choctawhatchee formation [*Ecphora* zone]: station 1/962, cut in old road to Watson's Landing, Liberty County, Florida (Mansfield, 1930:66).

REMARKS: Mansfield described *alumense* as a variety of *maximus* Conrad (1839).

alveatum [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, pp. 583-584; 1866, Am. Jour. Conch., vol. 2, p. 68, pl. 3. fig. 7 [as *Busycon*]; Gill, 1867, Am. Jour. Conch., vol. 3, p. 149 [as *Sycotypus*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 524, fig. 8 [as *Sycotypus*].

TYPE LOCALITY: Miocene—St. Marys formation?: St. Marys Riv-

er, St. Marys County, Maryland (Conrad, 1863:583-584) and (Gill, 1867:149).

REMARKS: Conrad (1863:583-584) described this species from one specimen; Dall (1890:112) considered *alveatum* Conrad (1863) a junior synonym of *pyrum incile* Conrad (1833).

RÉSUMÉ: *incile* Conrad (1833) = ? *conradi* Tuomey and Holmes (1857) = ? *canaliferum* Conrad (1863 = *alveatum* Conrad (1863).

amoenum [*Busycon*] Conrad, 1875, [in] Kerr, Geol. Surv. No. Car. Rept., vol. 1, App. A, p. 23; Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, pp. 238-239, pl. 34, figs. 2, 4-6, pl. 35, fig. 5 [as *Busycon*].

TYPE LOCALITY: Pliocene—Waccamaw formation: Walker's Bluff, Cape Fear River, Bladen County, North Carolina (Conrad, 1875:23) and (Gardner, 1948:238-239).

OCCURRENCE: Upper Miocene—Duplin marl ?: 4 to 5 miles below Lumberton, Robeson County, North Carolina (Gardner, 1948:238-239). Pliocene—Waccamaw formation: Neills Eddy Landing, Cape Fear River, 3 miles north of Cronly, Columbus County, North Carolina (Gardner, 1948:238-239).

**argutus* [*Fulgur*] Clark, 1895, Johns Hopkins Univ. Circ., vol. 15, no. 121, p. 4.

TYPE LOCALITY: "Eocene"—Pamunkey group ?: Potomac Creek, Virginia; Pamunkey Neck, Maryland (Clark, 1895:4).

REMARKS: Not a *Busycon;* may be referred to *Fulguroficus argutus* (Clark, 1895).

aruanus [*Murex*] Linné [in part], 1758, Syst. Nat., ed. 10, vol. 1, p. 753; 1767, ed. 12, vol. 1, pt. 2, p. 1222 [as *Murex*]; Conrad, 1868, Am. Jour. Conch., vol. 3, p. 266, pl. 20, fig. 4 [*as Busycon*].

TYPE LOCALITY: Recent—New Guinea (Linné, 1758:753).

OCCURRENCE: Recent—East Coast of the United States from Cape Cod, Massachusetts to Cape Canaveral, Florida (Gardner, 1944:449).

REMARKS: B. Smith (1938:18) stated that *aruanus* Linné (1758) actually represented two distinct species; one, an American shell, was renamed *carica* by Gmelin (1790), the other species, an Australian shell, was later named *Fusus proboscidiferus* by Lamarck (1822). The first revisor's rule favors the retention of *carica* for the American shell.

RÉSUMÉ: *aruanus* Linné (1758) [in part] = *carica* Gmelin (1790) = *muricatum* 'Bolten' Röding (1798) = *spinosum* Conrad (1863).

atraktoides [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, p. 450, pl. 49, figs. 9, 10.

TYPE LOCALITY: Middle Miocene—Oak Grove sand, Alum Bluff group: old Senterfeit mill, 4½ miles southwest of Laurel Hill, Walton County, Florida (Gardner, 1944:450).

REMARKS: Gardner (1944:450) believed this species to be apparently restricted in its distribution to the type locality.

ballastense [*Busycon*] Mansfield, 1937, Florida Geol. Surv., Bull. no. 15, p. 120.

TYPE LOCALITY: Lower Miocene—Tampa limestone: "silex beds" at Ballast Point, Tampa Bay, Hillsborough County, Florida (Mansfield, 1937:120, table 1).

REMARKS: Mansfield described *baalastense* as a variety of *tampaensis* Dall (1890); the species is known only from the type locality. Mansfield (1937:120) considered *ballastense* to represent *Busycon spiniger nodulatum* Dall, 1915, Bull. U. S. Nat. Mus., no. 90, p. 67, pl. 9, fig. 5, not *nodulatum* Conrad (1849), and not the records from the Chipola formation referred to by Dall (1915). See *sicyoides* Gardner (1944).

**bicarinatus* [*Fusus*] I. Lea, 1833, Contrib. Geology, p. 146, pl. 5, fig. 147.

TYPE LOCALITY: Eocene ? — Claiborne, Monroe County, Alabama (I. Lea, 1833:29, 31).

REMARKS: Not a *Busycon*. Conrad (1854:317) considered *bicarinatus* a junior synonym of *Fulgur trabeatum* (Conrad, 1833); may now be referred to as *Levifusus trabeatus* (Conrad, 1833).

RÉSUMÉ: *trabeatus* Conrad (1833) = *bicarinatus* I. Lea (1833).

bladenense [*Busycon*] Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, pp. 239-240, pl. 35, figs. 2, 4.

TYPE LOCALITY: Pliocene—Waccamaw formation: Walker's Bluff, Cape Fear River, Bladen County, North Carolina (Gardner, 1948: 239-240).

OCCURRENCE: Upper Miocene—Duplin marl: 2 miles below Lumberton on the Lumberton River, Robeson County, North Carolina (Gardner, 1948:239-240). Pliocene—Waccamaw formation: Neills Eddy Landing, 3 miles north of Cronly, Columbus County, North Carolina (Gardner, 1948:239-240).

REMARKS: Characterized by the possession of a broad, horizontal shoulder on which the spiral sculpture is limited to a few feeble lirations (Gardner, 1948:239-240).

**blakei* [*Busycon* ?] Conrad, 1855, U. S. House of Representatives Doc. no. 129, p. 11; 1857, Pacific R.R. Repts., vol. 5, pl. 2 [not pl. 1], fig. 13 [as "*Busycon* ?"].

TYPE LOCALITY: Eocene—Tejon formation: Cañada de las Uvas [Grapevine Canyon], Kern County, California (Conrad, 1855:11) and (Conrad, 1857).

REMARKS: Not a *Busycon;* may be referred to *Pseudoperissolax blakei* (Conrad, 1855).

blountense [*Busycon*] Mansfield, 1935, Florida Geol. Surv., Bull. no. 12, p. 33, pl. 3, figs. 3, 4.

TYPE LOCALITY: upper Middle Miocene—Choctawhatchee formation [*Arca* zone (upper part)]: station 12046, upper locality, Vaughan Creek, Walton County, Florida (Mansfield, 1935:33).

REMARKS: *blountense* Mansfield (1935) is questionably retained in the genus *Busycon;* this species is known only from the type locality.

burnsii [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, pp. 110-111; Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, p. 456, pl. 50, figs. 3, 4 [as *Busycon*].

TYPE LOCALITY: Lower Miocene—Chipola formation, Alum Bluff group: lower bed at Alum Bluff, vicinity of Bailey's Ferry, Liberty County, Florida (Dall, 1890:110-111) and (Gardner, 1944:456).

REMARKS: Dall (1890:110-111) considered *burnsii* a variety of

spiniger Conrad (1848); Gardner (1944:456) believed *burnsii* to be a distinct species.

canaliculatus [*Murex*] Linné, 1758, Syst. Nat., ed. 10, vol. 1, p. 753; Lamarck, 1822, Hist. Nat. An. s. Vert., vol. 7, pp. 137-138 [as *Pyrula*]; 1827, Encyclop. Meth., vol. 3, pl. 436, fig. 3 [as *Pyrula*]; Holmes, 1860, Post-Pleioc fossils So. Car., pp. 66-67, pl. 11, fig. 3 [as *Busycon*]; Dall, 1889, Bull. U. S. Nat. Mus., no. 37, p. 112, pl. 73, fig. 1 [as *Fulgur*]; Clark, 1906, [in] Shattuck, Maryland Geol. Surv., Plioc. and Pleistoc., p. 180, pls. 46, 47, 48 [as *Fulgur*].

TYPE LOCALITY: Recent—Canada (Linné, 1758:753).

OCCURRENCE: Miocene—St. Marys formation ?: St. Marys River, St. Marys County, Maryland (Conrad: 1854:317). Upper Miocene ?—Duplin marl ?: Natural Well, Duplin County, North Carolina (Conrad, 1854:317). Pliocene—Caloosahatchee formation [Nashua marl]: ½ mile SW of Golf Club, DeLeon Springs, Volusia County, Florida (Mansfield, 1939:30-31). "Post-Pliocene"—North Carolina and South Carolina (Tuomey, 1860:67). Pleistocene—Talbot formation: Wailes Bluff, near Cornfield Harbor, St. Marys County, Maryland (Clark, 1906:180). At Seaboard Air Lines R.R. crossing of Highway 41, north of Estero, Lee County, Florida; North Creek, near Osprey, Sarasota County, Florida (Richards, 1938:1289, 1293). New Orleans, Orleans Parish, Louisiana well of 1856 (Maury, 1922:86). Recent—Cape Cod, Massachusetts to St. Augustine, Florida (Johnson, 1934: 127).

REMARKS: Mansfield (1930:69) questionably referred several young specimens from the Choctawhatchee formation, near Hosford, Liberty County, Florida, and Harvey's Creek, Leon County, Florida to *canaliculatus* Linné (1758); however, Gardner (1948:242) believed that Mansfield's material is very similar to specimens of *concinnum* Conrad (1875) from the Waccamaw formation of North Carolina.

JUNIOR SYNONYM: *granulata* Link (1807).

VARIETIES: *granum* Linné (1758, 1767).

? *coronatus* Conrad (1840)

? *canaliferum* Conrad (1863) = *carolinensis* Emmons (1858)

canaliferum [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 560; Gill, 1867, Am. Jour. Conch., vol. 3, p. 149 [as *Sycotypus*]; Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 113 [as *Fulgur*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, pp. 525, 539 [as *Sycotypus*].

TYPE LOCALITY: Pliocene—Waccamaw formation: Grissett's Landing, Waccamaw River, above Conway ["Conwayborough"], Horry County, South Carolina (Tuomey and Holmes, 1857:xi, 146).

OCCURRENCE: Miocene—North Carolina and South Carolina (Gill, 1867:149). Upper Miocene ?—Duplin marl ?: marl, Cape Fear River, North Carolina (Emmons, 1858:250). Upper Miocene—Yorktown formation: 1½ miles north of Suffolk, Nansemond County, Virginia (Gardner, 1948:242). Pliocene—Waccamaw formation: South Carolina (Gardner, 1948:242).

REMARKS: Conrad (1863:56) referred *canaliferum* to *Busycon canaliculatum* Tuomey and Holmes, 1857, Pleioc. fossils So. Car., p. 146

[not p. 145], pl. 29, fig. 2, not *canaliculatus* Linné (1758) *sensu stricto*. Dall (1890:112) considered *canaliferum* a junior synonym of *pyrum incile* Conrad (1833); Gardner (1948:242) believed it to represent a variety of *canaliculatus* Linné (1758). Conrad (1863:560) and Gardner (1948:242) considered *Pyrula carolinensis* Emmons, 1858, No. Car. Geol. Surv. Rept., pp. 249-250, fig. 108 [not *carolinensis* Tuomey and Holmes (1857)] to be synonymous with *canaliferum* Conrad (1863).

candelabrum [*Pyrula*] Lamarck, 1822, Hist. Nat. An. s. Vert., vol. 7, p. 139; 1827, Encyclop. Méth., vol. 3, pl. 437, fig. 3 [as *Pyrula*].
TYPE LOCALITY: Recent—not given.
REMARKS: Gill (1867:145) considered *candelabrum* a junior synonym of *carica* Gmelin (1790); Tryon (1881:141) believed the species to represent exaggerated specimens of *eliceans* Denys de Montfort (1810) and therefore a junior synonym of *eliceans;* Grabau (1903: 531) considered *candelabrum* a variety of *eliceans* Denys de Montfort (1810).

caniculatus [*Murex*] Turton, 1806, [in] Linné, Syst. Nat., vol. 4, pp. 443-444; Say, 1822, Jour. Acad. Nat. Sci. Phila., ser. 1, vol. 2, p. 238 [as *Fulgur*].
TYPE LOCALITY: Recent—Canada and the Frozen Sea (Turton, 1806:443-444).
REMARKS: Error for ? *canaliculatus* Linné (1758); reference to Martini, pl. 67, fig. 742 only.

carica [*Murex*] Gmelin, 1790, Syst. Nat., ed. 13, vol. 1, pt. 6; p. 3545; Holmes, 1860, Post-Pleioc. fossils So. Car., p. 65, pl. 11, fig. 1 [as *Busycon*]; Gill, 1867, Am. Jour. Conch., vol. 3, p. 145 [as *Fulgur*]; Tryon, 1881, Man. Conch., vol. 3, pp. 140-141, pl. 57, figs. 387-389 [not fig. 390], pl. 58, fig. 400 [as *Fulgur*]; Dall, 1889, Bull. U. S. Nat. Mus., no. 37, p. 112, pl. 74, fig. 1 [as *Fulgur*]; 1890, Trans. Wagner Free Inst., Sci., vol. 3, pt. 1, p. 117 [as *Fulgur*]; Clark, 1906, [in] Shattuck, Maryland Geol. Surv., Plioc. and Pleistoc., p. 179, pls. 43, 44, 45 [as *Fulgur*].
TYPE LOCALITY: Recent—not given.
OCCURRENCE: Miocene—North Carolina (Conrad, 1854:318). Maryland (Holmes, 1860:65). Pliocene—North Carolina and South Carolina (Holmes, 1860:65). "Post-Pliocene"—Simmon's Bluff, Yonge's Island, Charleston County, South Carolina (Holmes, 1860: acknowledgements, 65). Pleistocene—Talbot formation: Wailes Bluff near Cornfield Harbor, St. Marys County, Maryland (Clark, 1906:179). Rose Bluff, south bank of Bell River, a branch of the St. Marys River, Nassau County, Florida; Dredging from St. John's River, opposite Mayport, Duval County, Florida; Fill along east side of Halifax River, a mile north of Ormond Beach, Volusia County, Florida; Daytona Beach, fill on west side of Halifax River, Volusia County, Florida; Spoil banks of Crane Creek Canal, 4½ miles west of Melbourne, Brevard County, Florida; "Haulover" between Indian River and Mosquito Lagoon, Allenhurst, Brevard County, Florida; Vero Beach, dredgings from canal west of spillway, Indian River County, Florida; Dredgings from Fort Pierce Harbor, St. Lucie County, Florida; Drainage ditch, 6 miles south of Fort Myers, Lee County,

Florida; North Creek, near Osprey, Sarasota County, Florida (Richards, 1938:1289, 1293). Shell ridge at Grand Chenier, Cameron Parish, Louisiana (Richards, 1939a:307,313). Recent—Cape Cod, Massachusetts to St. Thomas Island, West Indies (Smith, M., 1951:124). Gulf Coast, west Florida, and Galveston, Texas (Maury, 1922:86).
REMARKS: B. Smith (1938) considered *carica* Gmelin (1790) to be the genotype of *Busycon*.
JUNIOR SYNONYMS: *muricatum* 'Bolten' Röding (1798)
spinosum Conrad (1863)
VARIETIES: *eliceans* Denys de Montfort (1810) = *candelabrum* Lamarck (1822).
RÉSUMÉ: *aruanus* Linné (1758) [in part] = *carica* Gmelin (1790) = *muricatum* 'Bolten' Röding (1798) = *spinosum* Conrad (1863).

carinatum [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, pp. 286, 560; 1868, Am. Jour. Conch., vol. 3, pp. 265-266, pl. 19, fig. 2. [as *Busycon*]; Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 117 [as *Fulgur*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 528, fig. 12 [as *Fulgur*]; Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, p. 240, pl. 35, fig. 6 [as *Busycon*].
TYPE LOCALITY: Miocene—Virginia (Conrad, 1863:286, 560).
OCCURRENCE: Miocene—Maryland and Virginia (Dall, 1890: 117).
REMARKS: Gardner (1948: pl. 35, fig. 6) figured the holotype and stated that the species has not been recognized in later collections.

carolinensis [*Cassidulus*] Toumey and Holmes, 1857, Pleioc. fossils So. Car., pp. 147-148, pl. 30, fig. 1; Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 560 [not p. 584] [as *Busycon*].
TYPE LOCALITY: Pliocene ?—Sumter County, South Carolina (Tuomey and Holmes, 1857:148).
REMARKS: Conrad (1863:560) questionably referred *carolinensis* Tuomey and Holmes (1857) to *excavatus* Conrad (1840); Gill (1867: 150) placed the species in the synonymy of *excavatus* Conrad (1840); Dall (1890:112) considered the species a junior synonym of *pyrum excavatum* Conrad (1840). Note: *carolinensis* Tuomey and Holmes 1857), not *Pyrula carolinensis* Emmons, 1858, No. Car. Geol. Surv. Rept., pp. 249-250, fig. 108 [see remarks under *canaliferum* Conrad 1863)].

carolinense [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 584 [not p. 560], not *carolinensis* Tuomey and Holmes (1857).
TYPE LOCALITY: Pliocene ?—Godfrey's Ferry, Pee Dee River, Horry County, South Carolina; "Smith's, Goose Creek" = "The plantation of the Late Geo. Henry Smith, Esq.; . . .", South Carolina (Tuomey and Holmes, 1857:xi).
REMARKS: Conrad (1863:584) referred to Tuomey and Holmes, 1857, pl. 29, fig. 3, as an illustration of his species *carolinense*, this is the same plate and figure reference that Conrad (1863:560) cited for *adversarium* Conrad (1863), therefore, *carolinense* Conrad (1863: 584 [not p. 560] is junior synonym of *adversarium* Conrad (1863:560). It should be noted that *adversarium* Conrad (1863:560) referred to Tuomey and Holmes, 1857, pl. 29, fig. 3, whereas *adversarium* (1863: 584) referred to Tuomey and Holmes 1857, pl. 29, fig. 2.
RESUMÉ: *contrarius* Conrad (1840) = ? *gibbosum* Conrad (1854) =

adversarium Conrad (1863) = *carolinense* Conrad (1863:584 [not p. 560)].

chowanense [*Busycon*] Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, p. 241, pl. 36, fig. 4.
TYPE LOCALITY: Upper Miocene—Yorktown formation: ½ to ¾ of a mile above Edenhouse Point, Chowan River, Bertie County, North Carolina (Gardner, 1948:241).
OCCURRENCE: Upper Miocene—Yorktown formation: "(?) York-County, Virginia." (Gardner, 1948:241).
(Gardner, 1948:242).
REMARKS: Described from an imperfect specimen which is characterized by regularly convex spiral fillets and the lack of axial sculpture (Gardner, 1948:241).

cingulatum [*Busycon*] 'Bolten' Röding, 1798, Mus. Boltenianum, pt. 2, p. 149 [*nomen nudum*]; Smith, B., 1938, Nautilus, vol. 52, no. 1, p. 17.

coarctata [*Pyrula*] Sowerby, 1825, Cat. Shells Tankerville, App. p. 17; Petit de la Saussaye, 1852, Jour. de Conch., vol. 3, pp. 145, 155, pl. 7, fig. 3 [as *Pyrula*]; Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 117 [as *Fulgur*]; Clench, 1951, Occas. Paps. Mollusks, vol. 1, no. 16, pp. 405-409, pl. 50, [as *Busycon*].
TYPE LOCALITY: Recent—not given.
OCCURRENCE: Recent—Campeche Bank [21°31'N. Lat., 90°20'W. Long., in 16 fathoms], Yucatan, Mexico (Clench, 1952:408).
REMARKS: Johnson (1934:126) considered the fossil species *rapum* Heilprin (1887) an antecedent of *coarctata* Sowerby (1825).

concinnum [*Busycon*] Conrad, 1875, [in] Kerr, No. Car. Geol. Surv. Rept., vol. 1, App. A, pp. 23-24; Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, p. 242, pl. 33, figs, 1, 3 [as *Busycon*].
TYPE LOCALITY: Pliocene—Waccamaw formation ?: "Mr. King's marl", Sampson County, North Carolina (Conrad, 1875:23) and (Gardner, 1948-242).
OCCURRENCE: Upper Miocene ?—Duplin marl ?: Cape Fear River, 10 miles above Elizabethtown, Bladen County, North Carolina (Johnson, 1903:75). Pliocene—Waccamaw formation: Walker's Bluff, Cape Fear River, Bladen County, North Carolina; Neills Eddy Landing, Cape Fear River, Columbus County, North Carolina (Gardner, 1948: 242).

conradi [*Busycon*] Tuomey and Holmes, 1857, Pleioc. fossils So. Car., p. 147, pl. 29, fig. 4; Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, p. 242, pl. 33, fig. 2 [as *Busycon*].
TYPE LOCALITY: Upper Miocene—Duplin marl: Sumter County, South Carolina (Tuomey and Holmes, 1857:147) and (Gardner, 1948: 242).
REMARKS: Conrad (1863:561) assigned this species to the synonymy of *incile* Conrad (1833); Dall (1890:112) considered *conradi* a junior synonym of *pyrum incile* Conrad (1833). Grabau (1903:524-525) and Gardner (1948:242) stated that *conradi* Tuomey and Holmes (1857) is a good species which parallels *incile* Conrad (1833) in morphologic development.

contrarius [*Fulgur*] Conrad, 1840, Am. Jour. Sci., ser. 2, vol. 39, p. 387; 1861, Fossile Med. Tert. U. S., no. 4, pp. 81-82, pl. 45, fig. 11 [as

Busycon]; 1868, Am. Jour. Conch., vol. 3, p. 266, pl 23, fig. 2 [as *Busycon*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 532, fig. 16 [as *Fulgur*]; Smith, B., 1944, Palaeontographica Americana, vol. 3, no. 17, pp. 163-169, pl. 15, figs. 1-6 [as *Busycon*]; Smith, M., 1951, East Coast Marine Shells, ed. 4, pp. 124-125, pl. 40, fig. 18 [dextral], pl. 48, fig. 4, pl. 49, fig. 7, pl. 58, fig. 1 [monstrosity] [as *Busycon perversum* Linné (1758)].

TYPE LOCALITY: Upper Miocene—Duplin marl: Natural Well, Duplin County, North Carolina (Conrad, 1840:387) and (Smith, B., 1939:26).

OCCURRENCE: Miocene—North Carolina and South Carolina (Gill, 1867:146). Pliocene—Caloosahatchee formation: St. Petersburg, Pinellas County, Florida [dredge dumps] (Olsson and Harbison, 1953: 211). Pleistocene—Live Oak Bar formation: west shore of San Antonio Bay, Refugio County, Texas; Intracoastal Waterway dredge dumps, Aransas Bay, Texas (Univ. Calif. Mus. Paleo. locs. A-9597 and A-7414). Recent—Cape Hatteras, North Carolina to Cuba [as *Busycon perversum* Linné (1758)] (Smith, M., 1951:125). Aransas Bay, Texas (Univ. Calif. Mus. Paleo. loc. A-7565).

REMARKS: Conrad (1863:560) stated that *contrarius* Conrad (1840) = *Busycon perversum* Emmons, 1858, No. Car. Geol. Surv. Rept., pp. 107, 249, not *perversus* Linné (1758); see remarks under *perversus* Linné (1758).

JUNIOR SYNONYMS: ? *gibbosum* Conrad (1854)
adversarium Conrad (1863)
carolinense Conrad (1863:584 [not p. 560]).

coronatus [*Fulgur*] Conrad, 1840, Fossils Med. Tert. U. S., no. 2, cover p. 4; 1842, Proc. Nat. Instn. Prom. Sci., Bull. 2, p. 187 [as *Fulgur*]; 1861, Fossils Med. Tert. U. S., no. 4, p. 82, pl. 46, fig. 1 [as *Busycon*]; 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 560 [as *Busycon*]; 1868, Am. Jour. Conch., vol. 3, p. 267, pl. 24, fig. 1 [as *Sycotypus*]; Harris, 1893, Am. Jour. Sci., ser. 3, vol. 45, pp. 24, 28 [as *Fulgur*]; Martin, 1904, [in] Clark, Shattuck, and Dall, Maryland Geol. Surv., Miocene, pp. 180-181, pl. 46, figs. 1a, 1b [as *Fulgur*].

TYPE LOCALITY: Miocene—St. Marys formation: St. Marys River, St. Marys County, Maryland (Conrad, 1861:82) and (Martin, 1904: 180-181).

OCCURRENCE: Miocene—St. Marys formation: Cove Point (?), Calvert County, Maryland (Martin, 1904:180-181).

REMARKS: It is quite possible that *coronatus* Conrad (1840) is a variety of *canaliculatus* Linné (1758).

**crassicauda* [*Busycon*] Philippi, H. Adams and A. Adams, 1853, Gen. Recent Moll., vol. 1, p. 151.

TYPE LOCALITY: Recent—China (Philippi, 1848:98).

REMARKS: Not a *Busycon*. Originally described as *Pyrula crassicauda* Philippi, 1848, Zeitsch. Malak., p. 98; may be referred to *Hemifusus tuba* (Gmelin, 1790).

cretaceum [*Busycon*] Wade, 1917, Am. Jour. Sci., ser. 4, vol. 43, pp. 296-297, figs. 1, 2; Wenz, 1943, Hand. Paläozool., vol. 6, Gastropoda, div. 6, pt. 8, pp. 1218-1219, fig. 3464 [as *Busycon*].

TYPE LOCALITY: Upper Cretaceous—Ripley formation: Dave

Weeks Place on Coon Creek, McNairy County, Tennessee (Wade, 1917:296-297).

REMARKS: This species is known only from one specimen from the type locality (Wade, 1917:297). Stephenson, 1941, Univ. Texas Publ. no. 4101, p. 324, considered incomplete internal and external molds of a large gastropod from the Nacatoch sand, Navarro group (Upper Cretaceous) of Texas to have some features in common with *cretaceum* Wade (1917), but concluded that the material was not sufficient to be considered conspecific. This species is questionably retained in the genus *Busycon.*

**dallianum* [*Fulgur* ?] Harris, 1896, Bull. Am. Paleo., vol. 1, no. 4, pp. 210-211, pl. 9, fig. 13.

TYPE LOCALITY: "Eocene"—Wilcox County, Alabama (Harris, 1896:211).

REMARKS: Not a *Busycon.* Harris (1896:210-211) described *dallianum* from an unique specimen with only an apical fragment preserved; may be questionably referred to *Levifusus* or possibly *Protobusycon.*

dasum [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, pp. 451-452, pl. 50, figs. 10, 11.

TYPE LOCALITY: Middle Miocene—Shoal River formation, Alum Bluff group: Flournoy's millrace, 2 miles east of Argyle, Walton County, Florida (Gardner, 1944:451-452).

OCCURRENCE: Middle Miocene—Shoal River formation, Alum Bluff group: 6 miles west-northwest of Mossyhead, Walton County, Florida; Shell Bluff, Shoal River, Walton County, Florida; Near Mossyhead, sec. 6, T.3N., R.21W., Walton County, Florida; Summerville millrace, 1 mile east of Argyle, Walton County, Florida (Gardner, 1944:451-452).

dubium [*Busycon*] 'Bolten' Röding, 1798, Mus. Boltenianum, pt. 2, p. 149 [*nomen nudum*]; Smith, B., 1938, Nautilus, vol. 52, no. 1, p. 17.

dumosum [*Busycon*] Conrad, 1868, Am. Jour. Conch., vol. 3, p. 266, pl. 19, fig. 3.

TYPE LOCALITY: not given ["Miocene" ?].

REMARKS: Dall (1890:110) considered *dumosum* Conrad (1868) a junior synonym of *spiniger* Conrad (1848).

RÉSUMÉ: *spiniger* Conrad (1848) = *striatum* Conrad (1863) = *dumosum* Conrad (1868).

echinatum [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, pp. 117-118, pl. 9, fig. 2.

TYPE LOCALITY: Upper Pliocene—Caloosahatchee formation: Caloosahatchee River and Shell Creek, [Lee County ?], Florida (Dall, 1890:117-118).

OCCURRENCE: Upper Pliocene—Caloosahatchee formation: St. Petersburg, Pinellas County, Florida [dredge dumps] (Olsson and Harbison, 1953:213).

elegans [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 583; 1867, Am. Jour. Conch., vol. 3, pp. 183-184 [as *Sycotypus*].

TYPE LOCALITY: not given.

REMARKS: Conrad (1867:183-184) considered *elegans* Conrad (1863) a variety of *plagosum* Conrad (1863); Dall (1890:112) placed *elegans*

in the synonymy of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].

RÉSUMÉ: *spirata* Lamarck (1816) = *pyrum* Dillwyn (1817) = *pyruloides* Say (1822) = *plagosum* Conrad (1863) = *elegans* Conrad 1863) = *pyriformis* Conrad (1867).

eliceans [*Fulgur*] Denys de Montfort, 1810, Conch. Syst., vol. 2, pp. 502-504, fig.; Tryon, 1881, Man. Conch., vol. 3, p. 141 [as *Fulgur*]; Morris, 1951, A field guide to the shells . . ., p. 205, pl. 38, fig. 7 [as *Busycon*].

TYPE LOCALITY: Recent—American seas (Denys de Montfort, 1810:502-504).

OCCURRENCE: Recent—North Carolina to Florida (Johnson, 1934: 126). South Carolina to Campeche, Mexico (Maury, 1922:86).

REMARKS: Gill (1867:145) considered *eliceans* Denys de Montfort (1810) a junior synonym of *carica* Gmelin (1790); Tryon (1881:141), Johnson (1934: 126), and Morris (1951:205) referred to *eliceans* as a variety of *carica* Gmelin (1790).

JUNIOR SYNONYM: *candelabrum* Lamarck (1822).

elongatus [*Sycotypus*], Gill, 1867, Am. Jour. Conch., vol. 3, pp. 150-151, text fig.

TYPE LOCALITY: Miocene—North Carolina (Gill, 1867:150-151).

REMARKS: Gill (1867: 150-151) stated that *elongatus* is closely related to *excavatus* Conrad (1840); Dall (1890:112) questionably referred *elongatus* to *pyrum excavatum* Conrad (1840) due to the loss of the unique type specimen (1890:113).

**eocense* [*Fulgur*] Aldrich, 1895, Bull. Am. Paleo., vol. 1, no. 2, p. 62, pl. 3, figs. 7, 7a; Harris, 1899, Bull. Am. Paleo., vol. 3, p. 65, pl. 8, fig. 13 [as *Triton*].

TYPE LOCALITY: "Eocene"—Matthew's Landing and Gregg's Landing, Alabama (Aldrich, 1895:62).

REMARKS: Not a *Busycon;* may be referred to *Perissolax eocensis* (Aldrich, 1895).

epispiniger [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, p. 454, pl. 50, fig. 6.

TYPE LOCALITY: Lower Miocene—Chipola formation, Alum Bluff group: Tenmile Creek, 1 mile west of Bailey's Ferry, Calhoun County, Florida (Gardner, 1944:454).

REMARKS: Gardner (1944:454) restricted *spiniger* Conrad (1848) to the Oligocene (Vicksburg), considering it to be an analogy of *epispiniger* Gardner (1944). Gardner stated that *epispiniger* = *Fulgur spiniger* Dall [in part], 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 109, not *spiniger* Conrad (1848).

exactum [*Busycon*] "Conrad" Olsson and Harbison, 1953, Acad. Nat. Sci. Phila., Monogr. no. 8, p. 212, pl. 34, fig. 6 as *excavatum* Conrad.

OCCURRENCE: Upper Miocene—Duplin marl: Natural Well, Duplin County, North Carolina (Olsson and Harbison, 1953:212).

REMARKS: Error for/or emendation of *excavatus* Conrad (1840).

excavatus [*Fulgur*] Conrad, 1840, Am. Jour. Sci., ser. 2, vol. 39, p. 387; 1861, Fossils Med. Tert. U. S., no. 4, p. 82, pl. 45, fig. 12 [as *Busycon*]; Gill, 1867, Am. Jour. Conch., vol. 3, p. 150 [as *Sycotypus*]; Conrad, 1868, Am. Jour. Conch., vol. 3, p. 267, pl. 23, fig. 6 [as *Sycotypus*];

Dall, 1890, Trans Wagner Free Inst. Sci., vol. 3, pt. 1, p. 112 [as *Fulgur*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 522, fig. 5 [as *Sycotypus*].

TYPE LOCALITY: Upper Miocene—Duplin marl: Natural Well, Duplin County, North Carolina (Conrad, 1840:387) and (Conrad, 1861:82).

OCCURRENCE: Miocene—Maryland, Virginia, and North Carolina (Dall, 1890:112). Pliocene—South Carolina and Florida (Dall, 1890: 112).

REMARKS: Dall (1890:112) considered *excavatus* Conrad (1840) a variety of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].

JUNIOR SYNONYMS: *carolinensis* Tuomey and Holmes (1857)
elongatus Gill (1867).

**ficus* [*Sycotypus*] Gray [*ex* Adams MS], 1847, Proc. Zool. Soc. London, pt. 15, p. 135; 1850, Figs. Moll. Anim., vol. 3, pl. 261, fig. 4, vol. 4, p. 68.

TYPE LOCALITY: Recent—not given.

REMARKS: Not a *Busycon;* may be referred to *Bulla fide* Sherborn (1926:2378).

filosum [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 286; 1868, Am. Jour. Conch., vol. 3, p. 266, pl. 21, fig. 7 [as *Busycon*].

TYPE LOCALITY: Upper Miocene—Yorktown formation: York County, Virginia (Conrad, 1863:286).

JUNIOR SYNONYM: ? *obfilosum* Grabau (1903)

floridanum [*Busycon*] Olsson and Harbison, 1953, Acad. Nat. Sci. Phila., Monogr. no. 8, pp. 211-212, pl. 34, figs. 2, 2a, 2b, 2c.

TYPE LOCALITY: Pliocene—Caloosahatchee formation: St. Petersburg, Pinellas County, Florida [dredge dumps] (Olsson and Harbison, 1953:212).

REMARKS: Olsson and Harbison (1953:211) described *floridanum* as a subspecies of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816).

foerstei [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, p. 452, pl. 49, figs. 19,20.

TYPE LOCALITY: Middle Miocene—Oak Grove sand, Alum Bluff group: Gastropod Gulch, 5½ miles southeast of Bainbridge, Decatur County, Georgia (Gardner, 1944:452).

fusiformis [*Fulgur*] Conrad, 1840, Fossils Med. Tert. U. S., no. 2, cover p. 4; 1842, Proc. Nat. Instn. Prom. Sci., Bull. 2, p 187 [as *Fulgur*]; 1861, Fossils Med. Tert. U. S., no. 4, p 82, pl. 46, fig. 3 [as *Busycon*]; 1868, Am. Jour. Conch., vol. 3, p. 267, pl. 23, fig. 4 [as *Busycon*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 528, fig. 10 [as *Fulgur*]; Martin, 1904, [in] Clark, Shattuck, and Dall, Maryland Geol. Surv., Miocene, pp. 178-179, pl. 45, figs. 2, 3a, 3b [as *Fulgur*].

TYPE LOCALITY: Miocene—St. Marys formation: Patuxent River, St. Marys County, Maryland (Conrad, 1854:318) and (Conrad, 1861: 82).

OCCURRENCE: Miocene—Maryland and Virginia (Dall, 1890:117). St. Marys formation: St. Marys River, St. Marys County, Maryland; Cove Point, Calvert County, Maryland (Martin, 1904:178-179). Middle Miocene—Shoal River formation ?, Alum Bluff group: "in a bed

which overlies the Chipola [formation = Lower Miocene] and having an outcrop in a mill-race two miles east of Argyle, [Walton County] Florida'' (Johnson, 1903:74).

gibbosum [*Fulgur*] Conrad, 1854, Proc. Acad. Nat. Sci. Phila., vol. 6, p. 319; 1863, Proc. Acad. Nat. Sci. Phila, vol 14, p. 286 [as *Busycon*, in text of *filosum*].

TYPE LOCALITY: Recent—''It is not known to inhabit the coast of the United States, and is probably from Campeachy [Campeche] Bay.'' (Conrad, 1854:319).

REMARKS: Dall (1890:116) referred *gibbosum* Conrad (1854) to *perversus* Linné (1758); in light of present information it is difficult to ascertain whether the species represents *perversus* Linné (1758) or *contrarius* Conrad (1840).

granulata [*Volema*] Link, 1807, Besch. der Nat.-Samml. Univ. Rostock, pt. 3, p. 116; Mörch, 1852, Cat. Conch. Yoldi, vol. 1, p. 104 [as *Busycum*].

TYPE LOCALITY: not given.

REMARKS: Mörch (1852:104) and Tomlin and Winckworth (1936: 36) considered *granulata* Link (1807) a junior synonym of *canaliculatus* Linné (1758).

granum [*Murex*] Linné, 1758, Syst. Nat., ed. 10, vol. 1, p. 752; 1767, ed. 12, vol 1, pt. 2, p. 1222 [as *Murex*]; Say, 1822, Jour. Acad. Nat. Sci. Phila., ser. 1, vol. 2, p. 238 [as *Fulgur*].

TYPE LOCALITY: Recent—Mediterranean Sea (Linné, 1758:752).
Recent—Canada (Linné, 1767:1222).

REMARKS: Linné (1767:1222) described *granum* Linné (1758) as a variety of *canaliculatus* Linné (1758).

**idoleum* [*Busycon*] Jonas, H. Adams and A. Adams, 1853, Gen. Recent Moll., vol. 1, p. 151.

TYPE LOCALITY: Recent — ? China (Jonas, 1846:120).

REMARKS: Not a *Busycon*. Originally described as *Pyrula idoleum* Jonas, 1846, Proc. Zool. Soc. London, pt. 14, pp. 120-121; may be referred to *''Pyrula idoleum'' fide* Tryon (1881:252).

incile [*Fulgur*] Conrad, 1833, Am. Jour. Sci., ser. 1, vol. 23, p. 343; Gill, 1867, Am. Jour. Conch., vol. 3, p. 149 [as *Sycotypus*]; Dall [in part, *fide* Gardner (1948:241-242)], 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 112 [as *Fulgur*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 523, text fig. [as *Sycotypus*]; Smith, B., 1914, Proc. Acad. Nat. Sci. Phila., vol. 66, pp. 570, 574, pl. 24, figs. 4, 4a [as *Fulgur*]; Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, pp. 241-242 [as *Busycon*].

TYPE LOCALITY: Upper Miocene—Yorktown formation: Yorktown, York County, Virginia (Conrad, 1833:343) and (Gardner, 1948: 241-242).

OCCURRENCE: Lower Miocene—Chipola formation: Bailey's Ferry, several miles west of Alum Bluff, Chipola River, Calhoun County, Florida (Maury, 1902, Bull. Am. Paleo., vol. 3, no. 15, p. 371). Miocene—Maryland, Virginia, North Carolina, South Carolina, and Florida (Dall, 1890:112). Yellow marl, Burwell Bay, James River, Virginia (Smith, B., 1914:570. Upper Miocene—Yorktown formation: Fergusons Wharf, Isle of Wight County, Virginia; ¼ to ½ mile below

Suffolk Waterworks dam, Nansemond County, Virginia; 6 miles below Greenville at Cherry Landing on Tar River, Pitt County, North Carolina (Gardner, 1948:241-242). Pleistocene—shell ridge at Grand Chenier, Cameron Parish, Louisiana (Richards, 1939a:307, 313).

REMARKS: Dall (1890:112) stated that *incile* Conrad (1833) is a variety of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)] and further that *incile* = *Busycon canaliculatum* Tuomey and Holmes [in part], 1857, Pleioc. fossils So. Car., p. 146, pl. 29, fig. 2, not *canaliculatus* Linné (1758). Gardner (1948:242) considered all authentic records of *incile* Conrad (1833) to be restricted to Virginia, but lists on the same page the occurrence of *incile* in North Carolina.

JUNIOR SYNONYMS:

? *conradi* Tuomey and Holmes (1857)
? *canaliferum* Conrad (1863) = *carolinensis* Emmons (1858)
alveatum Conrad (1863)

inversum [*Busycon*] 'Bolten' Röding, 1798, Mus. Boltenianum, pt. 2, p. 149 [*nomen nudum*]; Smith, B., 1939, Nautilus, vol. 52, no. 1, p. 17.

kerrii [*Busycon*] Conrad, 1875, [in] Kerr, No. Car. Geol. Surv. Rept., vol. 1, App. A, p. 23, pl. 4, fig. 2.

TYPE LOCALITY: Pliocene—Waccamaw formation ?: "James King's marl pit, Sampson County," North Carolina (Conrad, 1875: 23).

kieneri [*Pyrula*] Philippi, 1848, Zeitsch. Malak., p .98.

TYPE LOCALITY: Recent—Antillean Ocean [Caribbean Sea] and Campeche Bay (Kiener, 1840:8).

REMARKS: Philippi (1848:98) referred to *Pyrula perversa* var. Kiener, 1840, Spéc. Gén. Icon. Coquil. Viv., vol. 6 [Famille de Canalifères, pt. 2], pp. 7, 8, pl. 9, fig. 2. B. Smith (1939:26) considered *kieneri* Philippi (1848) a junior synonym of *perversus* Linné (1758). RÉSUMÉ: *perversus* Linné (1758) = *kieneri* Philippi (1848) = ? *gibbosum* Conrad (1854).

libertiensis [*Busycon*] Mansfield, 1930, Bull. Florida Geol. Surv., no. 3, p. 68, pl. 10, fig. 3.

TYPE LOCALITY: Upper Miocene—Choctawhatcheee formation [*Ecphora* zone]: upper bed at Alum Bluff, Liberty County, Florida (Mansfield, 1930:68).

REMARKS: Mansfield (1930:68) described *libertiensis* as a variety of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)] and based his species on two imperfect specimens from the type locality. Mansfield considered *libertiensis* to = *incile* Dall, 1903, Trans. Wagner Free Inst. Sci., vol. 3, pt. 6, p. 1596, not *incile* Conrad (1833).

maximus [*Fulgur*] Conrad, 1839, Fossils Med. Tert. U. S., no. 1, cover p. 3; 1861, Fossils Med. Tert, U. S., no. 4, p. 83, pl. 47, fig. 1 [as *Busycon*]; 1867, Am. Jour. Conch., vol. 3, p. 184 [as *Busycon*] Dall [in part, *fide* Mansfield, 1930:66], 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 115 [as *Fulgur*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 529, fig. 13 [as *Fulgur*].

TYPE LOCALITY: Upper Miocene—Yorktown formation: Yorktown, York County, Virginia (Conrad, 1854:318).

OCCURRENCE: Upper Miocene—Duplin marl: Duplin County, North Carolina; Wilmington, New Hanover County, North Carolina (Dall, 1890:115 [*maximus sensu lato*]). Choctawhatchee formation: upper bed at Alum Bluff, Liberty County, Florida (Dall, 1890:115). Pliocene ?—Darlington, Darlington County, South Carolina (Dall, 1890: 115 [*maximus sensu lato*]). Pliocene—Caloosahatchee formation: on the Caloosahatchee River, Lee County, Florida (Dall, 1890:115 [*maximus sensu lato*]).

VARIETIES: *rapum* Heilprin (1887) = *obrapum* Grabau (1903)
? *tudiculatum* Dall (1890)
alumense Mansfield (1930)

**modestus* [*Sycotypus*] Conrad, 1865, Am. Jour. Conch., vol. 1, p. 151.

TYPE LOCALITY: Miocene ? ["Tertiary"]—Astoria, Clatsop County, Oregon (Conrad, 1848:433).

REMARKS: Not a *Busycon*. Originally described as *Pyrula modesta* Conrad, 1848, Am. Jour. Sci., ser. 2, vol. 5, p. 433, fig. 12; may be referred to *Ficus modestus* (Conrad, 1848).

montforti [*Busycon*] Aldrich, 1907, Nautilus, vol. 20, no. 11, p. 121, pl. 6, 2 figs.; Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, pp. 453-454, pl. 50, figs. 1, 2 [as *Busycon*].

TYPE LOCALITY: Middle Miocene—Shoal River formation, Alum Bluff group: Shoal River, Walton County, Florida (Aldrich, 1907: 121) and (Gardner, 1944:453-454).

OCCURRENCE: Middle Miocene—Shoal River formation, Alum Bluff group: 6 miles west-northwest of Mossyhead, Walton County, Florida; Shell Bluff, Walton County, Florida (Gardner, 1944:453-454).

muricatum [*Busycon*] 'Bolten' Röding, 1798, Mus. Boltenianum, pt. 2, p. 149.

TYPE LOCALITY: Recent—not given.

REMARKS: 'Bolten' Röding (1798:149) cited *carica* Gmelin (1790) as a reference for their species *muricatum;* this species is a junior synonym of *carica* Gmelin (1790).

RÉSUMÉ: *aruanus* Linné (1758) [in part] = *carica* Gmelin (1790) = *muricatum* 'Bolten' Röding (1798) = *spinosum* Conrad (1863).

nodulatum [*Fulgur*] Conrad, 1849, Jour. Acad. Nat. Sci. Phila., ser. 2, vol. 1, p. 207; 1850, vol. 2, pl. 1, fig. 7 [not fig. 6]; 1854, Proc. Acad. Nat. Sci. Phila., vol. 6, p 317 [as *Fulgur*].

TYPE LOCALITY: Oligocene ["Upper Eocene"]—Vicksburg, Warren County, Mississippi (Conrad, 1849:207).

REMARKS: Gardner (1944:454-455) believed Dall's (1890) *spiniger nodulatum* to be a new species [see *sicyoides* Gardner (1944)] and retained *nodulatum* Conrad (1849) as a distinct species [see also *ballastense* Mansfield (1937)]. Gardner (1944:456) restricted the concept of *nodulatum* Conrad (1849) to Conrad's (1850) fig. 7 [not fig. 6] which agrees with the original description of the species.

obfilosum [*Fulgur*] Grabau, 1903, Am. Natural., vol. 37, no. 440, pp. 533-534.

TYPE LOCALITY: Upper Miocene ?—Duplin marl ?: "marls of Cape Fear River, North Carolina." (Grabau, 1903:533-534).

REMARKS: Grabau, (1903:533-534) believed *obfilosum* to be a dis-

tinct species, but stated that it might represent a reversed condition of *filosum* Conrad (1863).

obrapum [*Fulgur*] Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 533.
TYPE LOCALITY: Upper Miocene and Pliocene ?—vague, Duplin marl and Caloosahatchee formation ? (Grabau, 1903:533).
REMARKS: Grabau (1903:533) considered *obrapum* a sinistral version of *rapum* Heilprin (1887).

**ocoyanus* [*Sycotopus* (*sic*)] Conrad, 1855, U. S. House of Representatives Doc. no. 129, p. 19; 1857, Pacific R.R. Repts., vol. 5, pl. 7, figs. 72, 72a [as *Sycotopus* (*sic*)].
TYPE LOCALITY: Miocene—Temblor formation: Ocoya [=Posa] Creek, near Baker's Ranch, Kern County, California (Conrad, 1855: 19).
REMARKS: Not a *Busycon;* may be referred to *Ficus* (*Trophosycon*) *ocoyana* (Conrad, 1855). Conrad's (1855) *ocoyana* is the type species of *Trophosycon* Cooper, 1894.

onslowensis [*Busycon*] Kellum, 1926, U. S. Geol. Surv., Prof. Paper 143, p. 40, pl. 11, figs. 1-3; Mansfield, 1937, Florida Geol. Surv., Bull. no. 15, pp. 17, 18 [as *Busycon*].
TYPE LOCALITY: Lower Miocene—Trent marl: Silverdale, Onslow County, North Carolina (Kellum, 1926:40).
REMARKS: Kellum (1926:40) described *onslowensis* as a variety of *spiniger* Conrad (1848).

**oregonensis* [*Fulgur*] Conrad, 1854, Proc. Acad. Nat. Sci. Phila., vol. 6, pp. 318-319; 1865, Am. Jour. Conch., vol. 1, p. 151 [as *Sycotyphus* (*sic*)], not *Priscofusus oregonensis* Conrad, 1865.
TYPE LOCALITY: Miocene—Columbia River, near Astoria, Clatsop County, Oregon (Conrad, 1854: 319).
REMARKS: Not a *Busycon.* Originally described as *Fusus oregonensis* Conrad, 1848, Am. Jour. Sci., ser. 2, vol. 5, p. 433, fig. 13; may be referred to *Ficus* (*Trophosycon*) *oregonensis* (Conrad, 1848).

perizonatum [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 111; Mansfield, 1937, Florida Geol. Surv., Bull. no. 15, pp. 119-120, pl. 4, figs. 8, 9 [as *Busycon*].
TYPE LOCALITY: Lower Miocene—Tampa limestone: "silex beds" at Ballast Point, Tampa Bay, Hillsborough County, Florida (Dall, 1890:111) and (Mansfield, 1937:120)
OCCURRENCE: Lower Miocene—Tampa limestone: Sixmile Creek near Orient Station, Hillsborough County, Florida; ? Stations 7358 and 12763, Anclote River at Tarpon Springs, Pinellas County, Florida (Mansfield, 1937:120, table 1).
REMARKS: Dall (1890:111) described *perizonatum* as a variety of *spiniger* Conrad (1848).

perversus [*Murex*] Linné, 1758, Syst. Nat., ed. 10, vol. 1, p. 753; 1767 ed. 12, vol. 1, pt. 2, p. 1222 [as *Murex*].
TYPE LOCALITY: Recent—American Ocean (Linné, 1758:753).
OCCURRENCE: Miocene—North Carolina and South Carolina (Dall, 1890:116). Upper Miocene — Choctawhatchee formation: Harvey's Creek and Jackson Bluff, Leon County, Florida (Mansfield, 1930:69). Pliocene—South Carolina; Caloosahatchee formation: SW Florida (Dall, 1890:116). Croatan sand: North Carolina (Mansfield, 1936,

Jour. Paleo., vol. 10, no. 7, p. 666). "Post-Pliocene"—North Carolina, South Carolina, and Florida (Myakka River) (Dall, 1890:116). Pleistocene—Eau Gallie, Brevard County, Florida; Vero Beach, dredgings from canal west of spillway, Indian River County, Florida; Dredgings from Fort Pierce Harbor, St. Lucie County, Florida; Dredgings from West Palm Beach Canal, 5 miles west of West Palm Beach, Palm Beach County, Florida; Torch Key, Monroe County, Florida; North Creek, near Osprey, Sarasota County, Florida; ⅛ mile south of Manatee Station, Manatee County, Florida; Gandy Bridge fill between Tampa and St. Petersburg, Hillsborough County, Florida; Six-mile Creek, Orient Station, Hillsborough County, Florida; Drainage ditch near Pinellas Park, Pinellas County, Florida; Fill at Spa Beach, St. Petersburg, Pinellas County, Florida (Richards, 1938:1288, 1289, 1290, 1293). Lake Borgne borings between Lake Borgne and Mississippi River, St. Tammany Parish, Louisiana; New Orleans Pumping Station no. 7, Orleans Parish, Louisiana (Richards, 1939a:305, 313). Dredgings from the Intra-Coastal Canal about 6 miles east of the Galveston-Point Bolivar Ferry, Galveston County, Texas; Cottage Haven Well, half a mile south of Rockport, ⅛ mile from Aransas Bay, maximum depth 44 feet, Aransas County, Texas (Richards, 1939b: 1889, 1891, 1896). Post-Pleistocene—Chenier au Tigre, Vermillion Parish, Louisiana; shell ridge at Grand Chenier, Cameron Parish, Louisiana; Dredgings from canal near Cameron Meadows Oil Feld, Cameron Parish, Louisiana (Richards, 1939a:306, 307, 313). Recent—Cape Hatteras, North Carolina to the Gulf of Mexico (Dall, 1890:116). Progreso, Yucatan; Campeche, Campeche; between Chenkan and Sabancuy, Campeche, Mexico (Weisbord, 1926:85).

REMARKS: B. Smith (1939:23) stated that after examining a photograph of the type that the name *perversus* Linné (1758) should be applied to the robust form *kierneri* Philippi (1848), and that the elongate form, which is generally referred to as *contrarius* Conrad (1840), is a valid species and not a junior synonym of *perversus* Linné (1758). In the light of present information it is difficult to ascertain whether the above listed occurrences refer to *perversus* Linné (1758) or *contrarius* Conrad (1840); for this reason the locality data, quoted from various authors, is questionably placed under *perversus* Linné (1758) and should be considered to represent *perversus* Linné "*sensu lato.*"

JUNIOR SYNONYMS: *kieneri* Philippi (1848)
? *gibbosum* Conrad (1854)

plagosum [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 583.

TYPE LOCALITY: Recent—"New Jersey ?" (Conrad, 1863:583).

REMARKS: Conrad (1863:583) stated that *plagosum* is allied to *pyrum* Dillwyn (1817); Gill (1867:150), Tryon (1881:143), and Dall 1890:112) considered *plagosum* Conrad (1863) a junior synonym of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].

RÉSUMÉ: *spirata* Lamarck (1816) = *pyrum* Dillwyn (1817) = *pyruloides* Say (1822) = *plagosum* Conrad (1863) = *elegans* Conrad (1863) = *pyriformis* Conrad (1867).

planulatum [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 114.
TYPE LOCALITY: Pliocene—Caloosahatchee formation: Shell Creek, Caloosahatchee River, Lee County, Florida (Dall, 1890:114).
OCCURRENCE: Pliocene—Caloosahatchee formation: St. Petersburg, Pinellas County, Florida; Fort Thompson, Hendry County, Florida (Olsson and Harbison, 1953:211).
REMARKS: Dall (1890:114) considered *planulatum* a questionable variety of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].

propecoronatum [*Busycon*] Mansfield, 1935, Florida Geol. Surv., Bull. no. 12, p. 32, pl. 3, figs. 1, 2.
TYPE LOCALITY: upper Middle Miocene—Choctawhatchee formation [*Arca* zone (upper part)]: Station 12046, upper locality, Vaughan Creek, Walton County, Florida (Mansfield, 1935:32).
REMARKS: Mansfield (1935:32) considered *propecoronatum* to be closely related to *coronatum* Conrad (1840).

propeincile [*Busycon*] Mansfield, 1930, Florida Geol. Surv., Bull. no. 3, p. 68, pl. 9, fig. 5.
TYPE LOCALITY: Upper Miocene—Choctawhatchee formation [*Ecphora* zone]: upper bed at Alum Bluff, Liberty County, Florida (Mansfield, 1930:68).
REMARKS: Mansfield (1930:68) considered *propeincile* a variety of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)]; one specimen is known to exist.

proterum [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, p. 457, pl. 50, fig. 5.
TYPE LOCALITY: Miocene—Roseland Plantation, 3½ miles southeast of Bainbridge, Decatur County, Georgia (Gardner, 1944:457).
OCCURRENCE: Middle Miocene—Oak Grove sand, Alum Bluff group: Florida (Gardner, 1944:457).
REMARKS: Gardner (1944:457) stated that *proterum* is one of the earliest known representatives of the subgenus *Sycotypus*.

pyriformis [*Sycotypus*] Conrad, 1867, Am. Jour. Conch., vol. 3, p. 186; 1868, vol. 3, p. 265, pl. 20, fig. 1; Heilprin, 1887, Trans. Wagner Free Inst. Sci., vol. 1, p. 74 [as *Fulgur*].
TYPE LOCALITY: Upper Miocene—Duplin marl ?: Natural Well, Duplin County ["Dauphin County"], North Carolina (Conrad 1867: 186).
OCCURRENCE: Pliocene—"Floridian formation" [= ? Caloosahatchee formation]: banks of the Caloosahatchee River, below Fort Thompson, [Lee County ?], Florida (Heilprin, 1887:74).
REMARKS: Dall (1890:112) considered *pyriformis* Conrad (1867) a junior synonym of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].

pyruloides [*Fulgur*] Say, 1822, Jour. Acad. Nat. Sci. Phila., ser. 1, vol. 2, pp. 237-238; 1831, Am. Conch., *Fulgur*, pl. 19.
TYPE LOCALITY: Recent—"inhabits the Southern coast" (Say, 1822:237).
REMARKS: Say (1822:237-238) believed that *pyruloides* might be synonymous with *pyrum* Dillwyn (1817); Say (1831: pl. 19) and Gill

(1867:150) considered *pyruloides* Say (1822) a junior synonym of *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].
RÉSUMÉ: *spirata* Lamarck (1816) = *pyrum* Dillwyn (1817) = *pyruloides* Say (1822) = *plagosum* Conrad (1863) = *elegans* Conrad (1863) = *pyriformis* Conrad (1867).

pyrum [*Bulla*] Dillwyn, 1817, Descript. Cat. Recent Shells, vol. 1, p. 485; Gill, 1867, Am. Jour. Conch., vol. 3, p. 150 [as *Sycotypus*]; Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 112 [as *Fulgur*].
TYPE LOCALITY: Recent—not given.
REMARKS: A junior synonym of *spirata* Lamarck (1816).
RÉSUMÉ: *spirata* Lamarck (1816) = *pyrum* Dillwyn (1817) = *pyruloides* Say (1822) = *plagosum* Conrad (1863) = *elegans* Conrad (1863) = *pyriformis* Conrad (1867).

radix [*Busycon*] Dall, 1903, Trans. Wagner Free Inst. Sci., vol. 3, pt. 6, p. 1590 [*nomen nudum*].
REMARKS: See remarks under *radix* Gardner (1944).

radix [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, pp. 452-453, pl. 49, figs. 17, 18.
TYPE LOCALITY: Middle Miocene—Oak Grove sand, Alum Bluff group: Yellow River, Okaloosa County, Florida (Gardner, 1944:452-453).
OCCURRENCE: Middle Miocene — Oak Grove sand, Alum Bluff group: "?" Old Senterfeit mill, 4½ miles southwest of Laurel Hill, Walton County, Florida (Gardner, 1944:452-453).
REMARKS: Gardner (1944:452-453) listed *radix* Dall (1903), a *nomen nudum*, in the synonymy of *radix* Gardner (1944).

rapum [*Fulgur*] Heilprin, 1887, Trans. Wagner Free Inst. Sci., vol. 1, p. 71, pl. 2, fig. 4; Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 115 [*as Fulgur*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 531, fig. 15 [as *Fulgur*].
TYPE LOCALITY: Pliocene—"Floridian formation" [= Caloosahatchee formation ?]: in the banks of the Caloosahatchee River, below Fort Thompson, [Lee County ?], Florida (Heilprin, 1887:71).
OCCURRENCE: Miocene—Florida (Mansfield, 1930:67). Upper Miocene—Choctawhatchee formation: Harvey's Creek, ½ mile above abandoned mill, Leon County, Florida (Mansfield, 1930:57). Pliocene—Caloosahatchee formation: St. Petersburg, Pinellas County, Florida [dredge dumps] (Olsson and Harbison, 1953:210).
REMARKS: Dall (1890:115) considered *rapum* Heilprin (1887) a variety of *maximus* Conrad (1839).
JUNIOR SYNONYM: *obrapum* Grabau (1903) [sinistral version]
VARIETIES: *tritonoides* Grabau (1903)

**reticulata* [*Sycotypus*] Gray [*ex* Adams MS], 1850, Figs. Moll. Anim., vol. 3, pl. 261, fig. 5, vol. 4, p. 68.
TYPE LOCALITY: Recent—not given.
REMARKS: Not a *Busycon;* may be referred to *Ficula fide* Sherborn (1930: 5483)

**reticulata* [*Sycotypus*] Lamarck, Tuomey and Holmes, 1857, Pleioc. fossils So. Car., p. 149, pl. 30, fig. 3; Emmons, 1858, No. Car. Geol. Surv. Rept., p. 250, fig. 109 [as *Sycotypus*].
TYPE LOCALITY: Recent—Indian Ocean (Lamarck, 1822:141).

REMARKS: Not a *Busycon*. Originally described as *Pyrula reticulata* Lamarck, 1822, Hist. Nat. An. s. Vert., vol. 7, p. 141; may be referred to *Ficus papyratius* (Say, 1822).

robesonense [*Busycon*] Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, p. 239, pl. 35, figs. 1, 3.

TYPE LOCALITY: Upper Miocene—Duplin marl: 4 miles north of Lumberton, Robeson County, North Carolina (Gardner, 1948:239).

OCCURRENCE: Upper Miocene—Duplin marl: 2 miles below Lumberton, at Fairmont (Ashpole), Robeson County, North Carolina; 1½ miles northeast of Fairmont, Robeson County, North Carolina (Gardner, 1948:239).

rugosus [*Fulgur*] Conrad, 1843, Proc. Acad. Nat. Sci. Phila., vol. 1, pp. 307-308; 1861, Fossils Med. Tert. U. S., no. 4, pp. 82-83, pl. 46, fig. 4 [as *Busycon*]; 1868, Am. Jour. Conch., vol. 3, p. 267, pl. 24, fig. 4 [as *Sycotypus*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 525, fig. 9 [as *Sycotypus*]; Martin, 1904, [in] Clark, Shattuck, and Dall, Maryland Geol. Surv., Miocene, pp. 181, 182, pl. 46, figs. 2a, 2b [as *Fulgur*].

TYPE LOCALITY: Miocene—St. Marys formation: St. Mary's River, St. Marys County, Maryland (Conrad, 1843:307-308).

OCCURRENCE: Middle Miocene—Calvert formation: Plum Point, Maryland; Choptank formation: Jones Wharf, Greensboro, Caroline County, Maryland (Martin, 1904:181, 182). Miocene—St. Mary's formation: Cove Point, Calvert County, Maryland (Martin, 1904:181, 182).

**rusticulata* [*Busycum*] De Basterot, Mörch, 1852, Cat. Conch. Yoldi, vol 1, p. 104.

TYPE LOCALITY: fossil only—Burdigala (Mörch, 1852: 104).

REMARKS; Not a *Busycon*. Originally described as *Pyrula rusticulata* De Basterot, 1825, Mém. Soc. Hist. Nat. Paris, vol. 2, pt. 1, p. 68 [not seen]; may be referred to *Tudicla rusticulata* (De Basterot, 1825).

scalaris [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 561 [*nomen nudum*].

scalarispira [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, pp. 561, 584; [?] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, pp. 111-112 [as *Fulgur*].

TYPE LOCALITY: Middle Miocene—Shiloh marl member, Kirkwood sand: Shiloh, Cumberland County, New Jersey (Conrad, 1863:584) and (Mansfield, 1930:67).

OCCURRENCE: Upper Miocene—Choctawhatchee formation: upper bed at Alum Bluff, Liberty County, Florida (Dall, 1890:111-112).

REMARKS: Mansfield (1930:67, 68) questioned whether *scalarispira* Conrad (1863) and *scalarispira* Dall (1890) are identical.

sicyoides [*Busycon*] Gardner, 1944, U. S. Geol. Surv., Prof. Paper 142-G, pp. 454-456, pl. 50, figs. 7, 8.

TYPE LOCALITY: Lower Miocene—Chipola formation, Alum Bluff group: 1 mile below Bailey's Ferry, Chipola River, Calhoun County, Florida (Gardner, 1944:454-456).

OCCURRENCE: Lower Miocene — Chipola formation, Alum Bluff group: Boynton Landing, Choctawhatcee River, Washington County,

Florida; Tenmile Creek, 1 mile west of Bailey's Ferry, Calhoun County, Florida (Gardner, 1944:454-456).

REMARKS: Gardner (1944:454-456) stated that *sicyoides* = *Fulgur spiniger* var. *nodulatum* Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 110 [in part, synonymy excluded], not *nodulatum* Conrad (1849); see *ballastense* Mansfield (1937).

spiniger [*Fusus*] Conrad, 1848, Proc. Acad. Nat. Sci. Phila., vol. 3, p. 286; 1848, Jour. Acad. Nat. Sci. Phila., ser. 2, vol. 1, p. 117, pl. 11, fig. 32; Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, pp. 109-111 [as *Fulgur*]; Martin, 1904, [in] Clark, Shattuck, and Dall, Maryland Geol. Surv., Miocene, pp. 177-178, pl. 45, figs. 1a, 1b [as *Fulgur*]; Gardner, 1945, Mem. Geol. Soc. Am., no. 11, p. 206 [as *Busycon*].

TYPE LOCALITY: Oligocene—vicinity of Vicksburg, Warren County, Mississippi (Conrad, 1848:286). Lower Oligocene—Red Bluff formation: Vicksburg, Warren County, Mississippi (Mansfield, 1937:18).

OCCURRENCE: Oligocene—at base of the upper Middle Oligocene sandstone, in the ashy bed on the east slope of a hill on an old road which crosses Miralejas-Cojta road 1829 meters south of Rancho Miralejas, Carlos Cantú, China, Neuvo Léon, Mexico (Gardner, 1945: 206). Lower Miocene—Chipola formation, Alum Bluff group: near the Chipola River, west Florida (Dall, 1890:109-111). Calvert formation: Plum Point, Maryland; Choptank formation: Jones Wharf, Greensboro, Caroline County, Maryland (Martin, 1904:177-178).

JUNIOR SYNONYMS: *striatum* Conrad (1863)
dumosum Conrad (1868)

VARIETIES: ? *burnsii* Dall (1890)
perizonatum Dall (1890)
tampaensis Dall (1890) and var. *ballastense* Mansfield (1937)
onslowensis Kellum (1926)

spinosum [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 583; 1867, Am. Jour. Conch., vol. 3, pp. 184-185 [as *Busycon*].

TYPE LOCALITY: Recent—Coasts of the United States (Conrad, 1863:583).

REMARKS: Conrad (1863:583) stated that *spinosum* had been confused with *carica* Gmelin (1790) by several authors; Gill (1867:145) considered *spinosum* Conrad (1863) a junior synonym of *carica* Gmelin (1790).

RÉSUMÉ: *aruanus* Linné (1758) [in part] = *carica* Gmelin (1790) = *muricatum* 'Bolten' Röding (1798) = *spinosum* Conrad (1863).

spirata [*Pyrula*] Lamarck, 1816, Encyclop. Méth., vol. 4, pl. 433, figs. 2a, 2b, Liste, p. 8; 1822, Hist. Nat. An. s. Vert., vol. 7, p. 142; Reeve, 1847, Conch. Icon., vol. 4, *Pyrula*, pl. 8, fig. 27.

TYPE LOCALITY: Recent—not given.

OCCURRENCE: Upper Miocene to Recent (Dall, 1890:112). Pliocene —Godfrey's Ferry, Pee Dee River, Horry County, South Carolina (Tuomey and Holmes, 1857:xi, 148). Caloosahatchee formation ?: Caloosahatchee River, Lee County ?, Florida (Smith, B., 1914:570). "Post-Pliocene"—Simmons' Bluff, Yonge's Island, Charleston County, South Carolina (Holmes, 1860: acknowledgements, 67 [one speci-

men]). Pleistocene—Cornfield Harbor, Maryland (Smith, B., 1914: 570). Goodno's Landing, on Caloosahatchee River, Hendry County, Florida; North Creek, near Osprey, Sarasota County, Florida; ⅛ mile south of Manatee Station, Manatee County, Florida; Gandy Bridge fill between Tampa and St. Petersburg, Hillsborough County, Florida; Sixmile Creek, Orient Station, Hillsborough County, Florida; Dredgings from Intra-Coastal Canal, Palm Valley, St. John's County, Florida; Fill along east side of Halifax River, one mile north of Ormond Beach, Volusia County, Florida; Eau Gallie, Brevard County, Florida (Richards, 1938:1288, 1289, 1293). Grand Chenier, Cameron Parish, Louisiana; New Orleans Pumping Station no. 7, Orleans Parish, Louisiana (Maury, 1922:55). Recent—North Carolina to Florida and Texas (Johnson, 1934:126). Gulf of Campeche, Mexico (Univ. Calif. Mus. Paleo. loc. A-7560).

REMARKS: The above occurrences and the following synonyms and varieties were originally listed as *pyrum* Dillwyn (1817) [= *spirata* Lamarck (1816)].

JUNIOR SYNONYMS: *pyrum Dillwyn* (1817)
pyruloides Say (1822)
plagosum Conrad (1863)
elegans Conrad (1863)
pyriformis Conrad (1867)

VARIETIES: ? *incile* Conrad (1833) = ? *conradi* Tuomey and Holmes (1857)
= ? *canaliferum* Conrad (1863)
= *alveatum* Conrad (1863)
excavatus Conrad (1840) = *carolinensis* Tuomey and Holmes (1857)
= *elongatus* Gill (1867)
aepynotum Dall (1890)
? *planulatum* Dall (1890)
libertiensis Mansfield (1930)
propeincile Mansfield (1930)
floridanum Olsson and Harbison (1953)

**spirillus* [*Busycum*] Linné, Mörch, 1852, Cat. Conch. Yoldi, vol. 1, p. 104.

TYPE LOCALITY: Recent—Tranquebar, Madras, India (Linné, 1767: 1221).

REMARKS: Not a *Busycon*. Originally described as *Murex spirillus* Linné, 1767, Syst. Nat., ed. 12, vol. 1, pt. 2, p. 1221; may be referred to *Tudicla spirilla* (Linné, 1767).

stellatum [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, pp. 114-115, pl. 4, fig. 9; Mansfield, 1937, Florida Geol. Surv., Bull. no. 15, pp. 120-121 [as *Busycon*].

TYPE LOCALITY: Lower Miocene—Tampa limestone: "Silex beds" at Ballast Point, Tampa Bay, Hillsborough County, Florida (Dall, 1890:114-115).

OCCURRENCE: Lower Miocene—Tampa limestone: "?" Sixmile Creek, near Orient Station, Hillsborough County, Florida (Mansfield, 1937:121).

**striata* [*Fulgur*] Savigny [? Gray], Tryon, 1881, Man. Conch., vol. 3, p. 143, pl. 58, fig. 404.
TYPE LOCALITY: Recent—not given.
REMARKS: Not a *Busycon*. Originally described as *Pyrula striata* Savigny [? Gray], 1834, [in Griffith and Pidgeon, Curvier's Animal Kingdom, vol. 12, Mollusca and Radiata, p. 599, pl. 37, fig. 4; may be referred to *Taphon striata* (Savigny, 1834), *striata* is the monotype of the genus *Taphon*. Tryon (1881:143) credited *striata* to "Gray" in Griffith's Cuvier; Sherborn, 1922, Index Animalium, vol. 2, pt. 1, p. lxii, stated that Gray's manuscript was never published. The citation in "Griffith's Cuvier" credits Savigny as being the author of *striata*.

striatum [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, pp. 561, 584; 1866, Am. Jour. Conch., vol. 3, p. 69, pl. 3, fig. 8 [as *Busycon*].
TYPE LOCALITY: Middle Miocene—Shiloh marl member, Kirkwood sand: Shiloh, Cumberland County, New Jersey (Conrad, 1863: 584) and (Mansfield, 1930:67).
OCCURRENCE: "Miocene"—Virginia or Maryland (Conrad, 1866: 69).
REMARKS: Dall (1890:110) and Martin (1904:177-178) considered *striatum* Conrad (1863) a junior synonym of *spiniger* Conrad (1848).
RÉSUMÉ: *spiniger* Conrad (1848) = *striatum* Conrad (1863) = *dumosum* Conrad (1868).

tampaensis [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, p. 111; Mansfield, 1937, Florida Geol. Surv., Bull. no. 15, p. 119 [as *Busycon*].
TYPE LOCALITY: Lower Miocene—Tampa limestone: "silex beds" at Ballast Point, Tampa Bay, Hillsborough County, Florida (Dall, 1890:111) and (Mansfield, 1937:119, table 1).
REMARKS: Dall (1890:111) described *tampaensis* as a variety of *spiniger* Conrad (1848).
VARIETIES: *ballastense* Mansfield (1937)

**trabeatus* [*Fulgur*] Conrad, 1834, Proc. Acad. Nat. Sci. Phila., vol. 6, p. 317.
TYPE LOCALITY: "Eocene"—Claiborne, Monroe County, Alabama (Conrad, 1833:29).
REMARKS: Not a *Busycon*. Originally described as *Fusus trabeatus* Conrad, 1833, Fossil Shells Tert. Form. No. Am., ed. 1, vol. 1, no. 3, p. 29; 1835, ed. 2, vol. 1, no. 3, pp. 53, 55, pl. 18, fig. 1; may be referred to *Levifusus trabeatus* (Conrad, 1833).
JUNIOR SYNONYM: *bicarinatus* I. Lea (1833)

**triserialis* [*Fulgur*] Whitfield, 1865, Am. Jour. Conch., vol. 1, p. 260.
TYPE LOCALITY: Oligocene ["Eocene"]—"Lignite Stage": nine miles below Prairie Bluff, Alabama (Whitfield, 1865:260) and (Harris, 1899, Bull. Am. Paleo., vol. 3, no. 11, p. 67).
REMARKS: Not a *Busycon;* may be referred to *Fulguroficus triserialis* (Whitfield, 1865).

tritonis [*Busycon*] Conrad, 1863, Proc. Acad. Nat. Sci. Phila., vol. 14, pp. 561, 583; 1868, Am. Jour. Conch., vol. 3, p. 265, pl. 20, fig. 2

[as *Busycon*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 530, fig. 14 [as *Fulgur*].

TYPE LOCALITY: Upper Miocene—Yorktown formation: Yorktown, York County, Virginia (Conrad, 1863:583).

REMARKS: Dall (1890:115) considered *tritonis* Conrad (1863) an extreme in variation of *maximus rapum* Heilprin (1887).

tritonoides [*Fulgur*] Grabau, 1903, Am. Natural., vol. 37, no. 440, pp. 532-533.

TYPE LOCALITY: not given.

REMARKS: Grabau (1903:532-533) considered *tritonoides* a variety of *rapum* Heilprin (1887).

tuberculatus [*Fulgur*] Conrad, 1840, Fossils Med. Tert. U. S., no. 2, cover p. 4; 1842, Proc. Nat. Instn. Prom. Sci., Bull. 2, p. 185 [as *Fulgur*]; 1861, Fossils Med. Tert. U. S., no. 4, pl. 46, fig. 2 [as *Busycon*]; Gill, 1867, Am. Jour. Conch., vol. 3, p. 146 [as *Fulgur*]; Conrad, 1868, Am. Jour. Conch., vol. 3, p. 266, pl. 23, fig. 1 [as *Busycon*]; Grabau, 1903, Am. Natural., vol. 37, no. 440, p. 528, fig. 11 [as *Fulgur*]; Martin, 1904, [in] Clark, Shattuck, and Dall, Maryland Geol. Surv., Miocene, pp. 179-180, pl. 45, figs. 4a, 4b [as *Fulgur*].

TYPE LOCALITY: Miocene—St. Marys formation: Patuxent River, St. Marys County, Maryland (Conrad, 1854:318) and (Conrad, 1861: 82).

OCCURRENCE: Miocene—St. Marys formation: St. Marys River, Cove Point, Calvert County, Maryland (Martin, 1904:179-180).

tudiculatum [*Fulgur*] Dall, 1890, Trans. Wagner Free Inst. Sci., vol. 3, pt. 1, pp. 115-116; Mansfield, 1930, Florida Geol. Surv., Bull. no. 3, p. 67, pl. 7, fig. 2 [as *Busycon*].

TYPE LOCALITY: Upper Miocene—Choctawhatchee formation [*Ecphora* zone]: upper bed at Alum Bluff, Liberty County, Florida (Dall, 1890:115-116) and (Mansfield, 1930:16).

REMARKS: Dall (1890:115-116) described *tudiculatum* as a variety of *maximus* Conrad (1839); Mansfield (1930:67) stated that there are only two specimens of this species known to exist. The authors questionably retain this species in the genus *Busycon*, specimens not seen.

willcoxi [*Busycon*] Gardner, 1948, U. S. Geol. Surv., Prof. Paper 199-B, p. 240, pl. 34, figs. 1, 3.

TYPE LOCALITY: Pliocene—Waccamaw formation ?: Cape Fear River, North Carolina (Gardner, 1948:240).

OCCURRENCE: Pliocene — Waccamaw formation: Walker's Bluff, Cape Fear River, Bladen County, North Carolina; Neills Eddy Landing, Cape Fear River, Columbus County, North Carolina (Gardner, 1948:240).

REMARKS: Gardner (1948:240) stated that "the only form which *B. willcoxi* is comparable is the Miocene *B. carinatum* Conrad, possibly an ancestral type."

sp. [*Busycon*] Gardner, 1945, Mem. Geol. Soc. Am., no. 11, p. 206.

TYPE LOCALITY: Miocene—Guajalote formation: near San Fernando, Tamaulipas, Mexico (Gardner, 1945:206).

REMARKS: Known only from poorly preserved molds. Referred by

Gardner (1945:206) to the subgenus *Sycotypus*, an interesting record from the Miocene of northeastern Mexico.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS AND NOTES ON SOME SPECIES OF CINARA (APHIDAE)

By F. C. Hottes and E. O. Essig

We describe herewith several new species of Aphids belonging to the genus *Cinara*.

Cinara alticola new species

Apterous viviparous female.

Size and general color.—This species is described from a single beautifully cleared and mounted specimen. Color notes taken from the living specimen are not available. Length from vertex to end of anal plate 3.86 mm. Color in life most likely yellowish brown with lateral portions of abdomen and regions on dorsum darker brown. Third antennal segment uniform yellowish, fourth and fifth segments pale yellowish except for extreme tips which are brownish, sixth segment pale at extreme base, rest of segment brownish. Femora rather pale-brownish. Tibiae similar to femora except for region near apex less than length of second segment of hind tarsis which is dark brown. Tarsi uniform dark brown. Dorso-lateral regions of abdomen with a single row of rather well developed wax pore plates. Cornicles within more deeply pigmented portion of latro-dorsal region of abdomen and not differentiated at base except for the fact that the cornicles carry two kinds of hairs, the shorter finer hairs not being found elsewhere on the body. Spiraces within deep brown areas. Rostrum with last three segments dark brown, apex of the second segment similar. Dorsum with about four irregular and rather indistinct dusky brown transverse bands. Transverse pigmented area apparently in the form of a wide dark brown band, with two rows of hairs.

Head and thorax.—Length of antennal segments as follows: III .657mm., IV .257mm., V .30mm., VI .157+.042mm. Third and fourth antennal segments with neither primary or secondary sensoria. Fifth antennal segment with primary sensorium present. Sixth antennal segment with marginal sensoria rather far removed from primary sensorium. Antennal hair sparse, spine-like, set at an angle of about forty-five degrees, the longest hairs just equal to the width of segment, some hairs about half as long as the longest. All hairs sharply pointed, deeply pigmented portion of antennae weakly imbricated. Head with dark median suture. Ocular tubercles well developed. Dorsum of head with many rather long sharp pointed hairs. Hind tibiae 2.50mm. in length, provided with straight sharp pointed spine-like hairs which vary in length from .085-.1 mm. or about three fifths width of tibia. These hairs are present in moderate number, and are set at an angle of about forty five degrees. The hairs on the inner margin are more droopy finer

and shorter than those on the outer margin. Mesosternal tubercle absent. First tarsal segment with about sixteen hairs, this segment is .143mm. in length, the second segment of the hind tarsis is .386mm. long. Rostrum with last three segments extending beyond metathoracic coxae.

Abdomen.—Dorsum of abdomen with many sharp pointed spine-like hairs each of which arises from a small pigmented tubercle. These hairs are about .085mm. in length and taper to a fine sharp point. The ventral surface of the abdomen has about the same number of hairs as the dorsum, but on this surface the hairs are much finer, and are intermixed as to length, some of the hairs being about half as long as others. Ventral plate with a moderate number of hairs, which are longer than most on the ventral surface. Cornicles with two kinds of hairs, and base indicated by extent of finer shorter ones, it is about .443mm. Cauda and anal plate normal for genus.

Holoype apterous viviparous female, deposited in the collection of E. O. Essig. Data on slide as follows: Charleston Mt. Park 9,000 ft. alt. June 22, 1940, R. Bohart.

This species is unquestionably allied to *Cinara hirta* H. & E. 1953. The two species may be differentiated at once by the character of the body hair, those of *hirta* being nail-like non tapering, those of *alticola* being tapering and sharp pointed. The cornicles of *hirta* have the rim of the cornicles strongly reflexed, this is not true of the cornicles of *alticola*. The body hairs of *hirta* are so abundant and close that they take on the appearance of fur, this is not true of *alticola*.

Cinara commatula new species

Apterous viviparous female.

Size and general color.—Described from a single specimen, much cleared and only in fair condition. Color notes from life not available. Length from vertex to end of anal plate about 4.71mm. Antennal segments with the following lengths: III .71mm., IV .37mm., V .37mm., VI .157+.042mm. Metathoracic legs missing. Primary sensoria present on all antennal segments, third segment without secondary sensoria, fifth segment with one. Rostrum extending beyond cornicles, last three segments with the following lengths: .30, .27, .08mm. Cornicles about .45mm. across base. Antennae head, cornicles and abdomen with numerous long fine hairs, these are similar in length and angle to those of the alate viviparous female.

Alatè viviparous female.

Size and general color.—The specimen selected as holotype is much cleared. Length from vertex to end of anal plate 4.30mm. Length of antennal segments as follows: III .70-.80mm., secondary sensoria five to eight, with wide rims, arranged in an irregular row, IV .30-.45mm. with two to three secondary sensoria, V .40-.43mm., fith one secondary sensorium. VI .15-.18+.05mm. All antennal segments light dusky. Hair on antennae abundant, about .08mm. in length, rather upstanding, but hair on fifth and sixth segments less so than that on other segments. First two antennal segments with more than usual number of hairs. Rostrum with last three segments with following lengths: .35, .28- .32,

10mm. Hind tibiae 3.17mm. long with numerous fine hairs which are from .10-.15mm. in length, upstanding, longer than two times width of segment. Hind tarsi .13,+.25-33mm. in length. First segment of hind tarsis with about twenty hair. Cornicles with base .40-.45mm. Both cornicles and abdomen with numerous fine hairs. Media twice branched, second branch closer to first than to margin of wing. Hair on inner margin of hind tibiae intermixed long and somewhat shorter, more numerous than on outer margin, and less upstanding. Pigmented area anterior to cauda divided with posterior margin with two rows of long fine hairs, the hairs in the two rows being interspaced. Cauda about one fifth longer than wide at the base. Lateral and posterior lobes of thorax with hair, anterior median lobe without hair.

This species will not key in Palmer's key to the genus *Cinara* in "Aphids of the Rocky Mountain Region."

From *C. sibiricae* (G & P) it differs in character of hairs on cornicles, in the type of unguis, color of legs. From *C. occidentalis* (D) this species differs in larger size of cornicles, number of hairs on antennae and legs and length of hind tarsi and first tarsal segment.

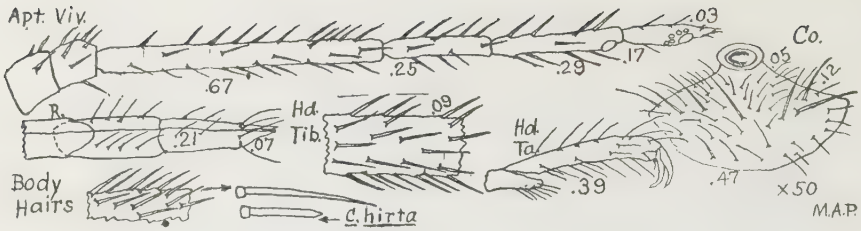
Holotype, alate viviparous female, morphotype, apterous viviparous female both mounted on the same slide which has been deposited in the collection of E. O. Essig. Taken on *Pseudotsuga taxifolia* Gualala, California Sept. 10, 1940, E. O. Essig.

Cinara cognita new species.

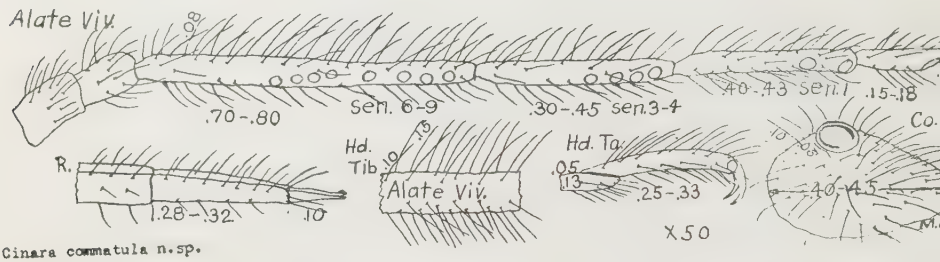
Apterous viviparous female.

This species is described from a single beautifully cleared and mounted specimen. Length from vertex to end of anal plate 3.57mm. Head and prothorax dusky brown. Mesothorax and metathorax each with two dark dusky spots on dorsum. First and second antennal segments concolorous with head, third, fourth and fifth segments pale with apical regions darker, sixth antennal segment uniform dusky. Femora pale at base shading to dusky brown before middle. Tibiae with knees dusky brown, followed by an extensive pale region which becomes dusky about two times length of tarsi before apex. Spiracles within brownish areas. Wax pore plates on dorsum of abdomen small and arranged in four irregular rows. Cornicles brownish, with very irregular margins, which differ on the right and left sides. Transverse pigmented spots very irregular towards middle, each provided with a row of hairs on the posterior margin, there is also a partial second row of hairs. Anterior to these areas there are a few small irregular pigmented spots.

Head and thorax.—Antennal segments with the following lengths: III .40mm., IV .15mm., V .18mm., VI .13+.02mm. Antennal segments three and four with neither primary or secondary sensoria. Primary sensoria present on the fifth segments, these segments also carry one secondary sensorium. Antennal hair sparse, shorter than width of segment, the ratio of length to width being 5-7. The hairs are set an an angle of about sixty degrees. Hair on head sparse, none are present directly adjacent to the eyes. Rostrum reaching about to the second abdominal segment. Metathoracic femora about .97mm. in length. Metathoracic tibiae 1.43mm. in length. Hair on tibiae sparse, that on inner margin more abundant than that on outer, also more inclined.



Cinara alticola n.sp.



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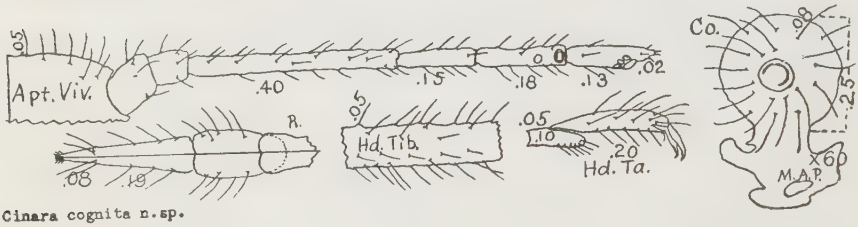
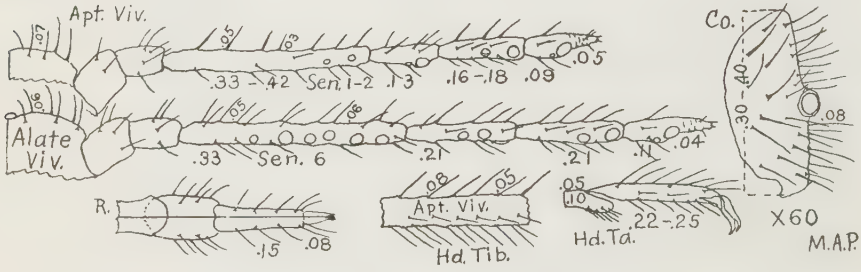
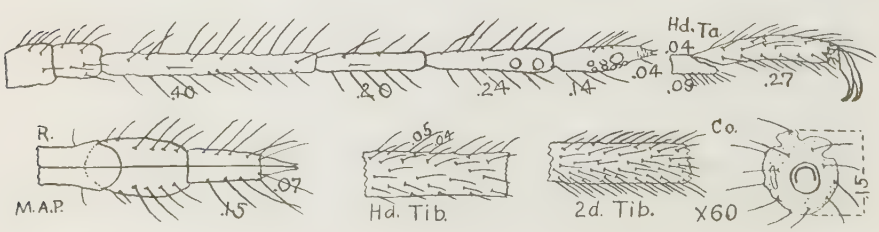


Cinara cognita n.sp.



Cinara azteca n.sp.



Cinara dubia n.sp

No tibial hairs as long as width of segment. Hair near base of tibiae very upstanding. First tarsal segment with about eight hairs, the hairs except for one not extending beyond dorsal attachment of second segment. Mesosternal tubercle absent.

Abdomen.—Cornicles about .25mm. across more regular portion of base, provided with few hairs, which for the most part are absent from the outer margin. Dorsum of abdomen with few hairs, hair on ventral surface more abundant. Ventral plate with ends broadly rounded, provided with only three hairs.

Cauda and anal plate normal for genus.

In Palmer's key to the genus *Cinara* in "Aphids of the Rocky Mountain Region" this species keys to *C. burrilli* (Wilson) a species to which it is allied, but from which it differs as follows: longer third antennal segment, fifth antennal segment longer than the fourth, pigmented portion of cornicles more extensive and more irregular in outline, more extensive pigmented portion of tibiae, hair on first tarsal segment not extending beyond origin of second segment, the absence of a secondary sensorium on the fourth antennal segment, and a much longer sixth antennal segment.

Holotype apterous viviparous female, taken on *Juniper*, Nevada County, near Cedarville, California, May 31, 1946. W. F. Barr, deposited in collection of E. O. Essig.

Cinara azteca new species

Alate viviparous female.

Size and general color.—Described from a single cleared and stained specimen. Color notes taken in life are not available, but the head, thorax, antennae, femora and tarsi have taken the stain very well and were perhaps dark to start with, cornicles brownish. Length from vertex to end of anal plate 2.86mm.

Head and thorax.—Length of antennal segments as follows: III .429 mm., IV .214mm., V .20mm., VI .1+.042mm. Secondary sensoria distributed as follows: III six to eight large sensoria arranged in a straight row, IV two, V one. All antennal segments with primary sensoria. The primary sensoria on segments five and six are large and have wide rims, sixth segment with about five marginal sensoria, this segment is almost reticulated. Hair on antennae only moderate in number, and but little longer than width of segment, and set at an angle of about sixty degrees, on third segment and slightly less on the other segments. Rostrum reaching about to the coxae of metathoracic pair of legs, last three segments with the following lengths: .185, .143, .057mm. Lateral lobes of thorax with hairs confined largely to median regions. Media twice branched, the second branch closer to the margin of the wing than to the first, all veins are very faint. Hind tibiae 1.78mm. in length, with few hairs, which are set at an angle of about sixty degrees or more, uniform on both margins, and about .071mm. in length. First sement of hind tarsis about .1mm. in length and provided with about eight hairs.

Abdomen.—Cornicles .347mm. across provided with numerous hairs which are about as long as those on the abdomen. Dorsum of abdomen with moderate number of hairs which vary in length from .057-.071mm.

Transverse pigmented spot divided, each half with a single row of long sharp pointed hairs.

Apterous viviparous female.

Length from vertex to end of anal plate varying from 2.02-2.28mm. Length of antennal segments as follows: III .347-.40mm., IV .128mm., V .157-.171mm., VI .08+.042mm. All hair as in alate. Primary sensoria present on all segments, secondary sensoria as follows: III 0-1, IV 0-1, V 1, Mesosternal tubercle absent. Cornicles as in alate. Hind tibiae 1.38-1.47mm. Hind tarsal segments .071 and .185mm.

Holotype, alate viviparous female, morphotype apterous viviparous female, both mounted on the same slide, which has been deposited in the collection of E. O. Essig. Data as follows: *Pinus oocarpa* ?, Garropatoa, Mexico, Jan. 1936. D. DeLeon Coll.

This species may be keyed to *C. terminalis* in Palmer's key to the genus *Cinara* in "Aphids of the Rocky Mountain Region," except that the host is not *Pinus edulis,*" and *Pinus oocarpa* ? is not likely to have been identified as such. However, the apterous viviparous female offers difficulty in keying because of couplet no. 27. Because the hairs on the hind tibiae are more nearly set at an angle of forty-five degrees and one becomes lost if the first alternative is taken. This species differs most from *terminalis* in the number of secondary sensoria on the third antennal segment of the alate, and by the presence of primary sensoria on all segments of the antennae of the apterous, and by the shorter rostrum.

Cinara dubia new species

Apterous viviparous female:

Size and general color.—This species is described from a single cleared specimen, color notes from life not available. Length from vertex to end of anal plate 2.86mm. Head and thorax light dusky brown, dorsum of thorax with patches of darker brown. Antennae dusky, third and fourth antennal segments with apical regions darker, fifth and sixth antennal segments darkest and uniform in color. Spiracles within dusky areas. Dorso-lateral portions of abdomen with two rows of small wax pore plates. Cornicles brown. Transverse pigmented spot anterior to cauda divided. Tibiae with apical halves brownish. Tarsi dark brown.

Head and thorax.—Antennal segments with the following lengths: III .40mm., IV .20mm., V .243mm., VI .143+.03mm. Third antennal segment with neither secondary or primary sensoria. Fourth segment without secondary sensoria and with or without primary. Fifth segment with one secondary sensorium and with primary. Antennal hair rather sparse that on anterior margin more upstanding than that on posterior margin, about .057mm. in length, with ratio to width of segment of about 10-7. Ocular tubercles rather small. Marginal sensoria on sixth antennal segment more or less in a row and rather far removed from the primary. Rostrum with segments four and five extending beyond coxae of metathorax, length of last three segments as follows: .20, .143, .07mm. Metathoracic tibiae 1.71mm. in length. Hair on hind tibiae rather sparse, and short, being about .043mm. in length, with some shorter. Hair near origin of tibiae very short for most part, and removed from one another by a distance greater than their length, no hair droopy.

First segment of hind tarsi with about eight hairs on the ventral surface and .085mm. in length, second segment .24mm. long.

Abdomen.—Cornicles with base rather irregular and about .143mm. across, provided with not more than two incomplete rows of hairs. Dorsum of abdomen with few hairs, these measure about .85mm. in length. Pigmented areas anterior to cauda provided with two irregular rows of long sharp pointed hairs. Just anterior to these pigmented areas there are a few small irregular pigmented spots, the two center ones being the largest and each provided with a clear central area.

Ventral plate crescent-shaped with the hairs confined for the most part to the ends of the crescent.

Holotype apterous viviparous female, taken on *Pseudotsuga taxifolia*, four miles South of Marshfield, Oregon June 4, 1941, J. Schuh Collector, deposited in collection of E. O. Essig.

This species shows affinity to *C. pseudotaxifoliae* Palmer, but can not be keyed to that species in Palmer's key to the genus *Cinara* in "Aphids of the Rocky Mountain Region," because of the character of the hair on the hind tibiae. It also differs from the species described by Prof. Palmer in the absence of the secondary sensorium on the fifth antennal segment, and the presence of a primary sensorium on the fourth. Our specimen is without mesothoracic legs, but a mesothoracic leg which may belong to our specimen is mounted close to it in correct position, as if it had come off in the mounting process. If this leg actually belongs, then the mesothoracic tibiae of *C. dubia* are much longer than those of *C. pseudotaxifoliae*. The metathoracic tibiae of our specimen are rather wide, but are only slightly more in width than those of *pseudotaxifoliae*. this may be due to clearing or to a teneral condition which has only effected the tibiae. This condition can hardly be expected to effect the length of th tibiae, so that they are actually much shorter than those of *pseudotaxifoliae*, or the number of hairs which are fewer.

Prof. Palmer has seen our slide, has determined it as questionably *C. pseudotaxifoliae* Palmer, has pointed out differences, to which we have added others, and agrees with us that it can not be called her species.

Cinara curvipes (Patch)

We have numerous records of this species from the Pacific Coast, where it has been taken on its normal host species of *Abies*. It has also been taken numerous times on *Cedrus deodara* a new host species for *curvipes*. This species is as a rule characterized by the comparatively short blunt tibial hairs. This condition apparently is a derived condition. We have seen numerous specimens, both alate and apterous where the tibial hairs are very long, very droopy, and extremely fine towards the end. We suspect that this fine, very thin portion of the hair is worn off to produce the more typical blunt condition. Some specimens show the tibial hairs in both conditions, and we have seen paratype specimens which illustrate this type. Similar specimens have been taken in Colorado.

Cinara schwarzii (W)

We have seen numerous specimens of this species taken on *Pinus* sp. at El Salto, Durango, Mexico, May 31, 1937 by A. R. Mead.

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PROCEEDINGS
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DESCRIPTIONS OF SOME NEW AMPHIBIANS AND REPTILES FROM GUATEMALA

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Collections made by the author and certain of his colleagues in southern and southeastern Guatemala between 1948 and 1952 contained amphibian and reptilian species previously unknown to science, together with other materials which have been reported previously in American and European museums. More thorough study of these latter reveals that they have been erroneously allocated and must be assigned new names at this time.

I wish to acknowledge financial assistance from the Horace H. Rackham School of Graduate Studies and the Baird Exploration Fund, both of the University of Michigan, which enabled me to carry on my field investigations in Guatemala. I am indebted especially to Dr. Colvin Gibson, formerly of the Onchocerciasis Project of the Panamerican Sanitary Bureau in Guatemala, and to Sr. Antonio Piloña, administrator of Finca La Gloria, Dept. Santa Rosa, Guatemala, for their patience in preserving materials which they turned over to me. Mr. Clifford Pope of the Chicago Natural History Museum has kindly made available to me material collected for his institution by Mr. Luis de la Torre.

While collecting in a hardwood forest on the Soledad Grande that lies between Mataquescuintla and Jalapa in 1952, I encountered in and beneath logs on the wet forest floor a species of *Pseudoeurycea* which appears to be undescribed. It may hereafter be known as

Pseudoeurycea exspectata new species

Holotype.—University of Michigan, Museum of Zoology No. 107999. An adult male collected by L. C. Stuart on March 21, 1952.

Type locality.—Broadleaf forest about 3 km. west of the aldea of Miramundo (about 7 air-line kilometers southeast of Jalapa), Department of Jalapa, Guatemala. Elevation, 2525 m.

Paratypes.—University of Michigan, Museum of Zoology, No. 106762 (16), collected with the holotype, and Chicago Natural History Museum Nos. 68730-49 (20), collected by Luis de la Torre at the type locality on April 8, 1952.

Diagnosis.—A *Pseudoeurycea* very probably most closely related to *goebeli* from which it differs in lacking the characteristic light marbling on the undersurface of the tail, in possessing a much lighter upper tail surface and much darker upper surfaces of the arms and legs.

Description of holotype.—Body form robust. Snout blunt and rela-

tively short, in length about equal to the horizontal diameter of the eye and considerably shorter than the upper eyelid. Head two-thirds as wide as long. Below the canthus a depressed region below which the loreal region bulges somewhat.

Lower jaw ovoid in outline. Nostrils small. Naso-labial grooves weakly developed. Labial protuberances only moderately developed. A well-developed gular fold that continues dorsally onto the sides of the head and then curves and continues forward as a weakly defined groove that terminates just anterior to the posterior corner of the eye. An ill-defined vertical groove just behind the angle of the jaws. A definite but non-too-well developed mental gland.

Costal grooves 11 in number between the axilla and groin. Digits long, especially the third, and rounded at the tips; a trace of web on fingers and toes, but two phalanges of finger III and of toes III-IV free of webs. Arms and legs robust. By measurement the adpressed limbs overlap to the extent of two costal interspaces, and their combined lengths therefore greater than the axilla-groin distance. Tail constriction poorly developed.

Vomarine teeth on a well defined ridge, 9-10 in number. Paravomarine teeth separated posteriorly but joined anteriorly to form an irregular mass, which is well separated from the vomarines. Maxillary teeth between 15-20 on each side. Four "bicuspid" premaxillary teeth piercing the lip. Tongue ovoid in outline, filling somewhat more than a third of the width of the lower jaw. Sublingual fold only moderately developed.

Head length to the gular fold 12.9 mm., greatest head width 8.4 mm., head-body length 52.7 mm., tail length 44.7 mm.

In spirits the entire ventral surface, with the exception of the throat and chin, is a dark, gun-metal blue. This color extends up onto the dorsum where it shades gradually into a dark, reddish brown which is lightest on the tail and darkest and most obscure on the surface of the head. The palmar surfaces of both hands and feet and the chin and throat are bluish white with a faint reddish tinge. A somewhat lighter inguinal gland is indicated.

Variation.—The individuals of the paratypic series are like the holotype in all essential details. The costal grooves are eleven in number though in several specimens there is an indication of a twelfth. The vomarine teeth vary 9-13. In all adult specimens the tail is either slightly shorter than or slightly longer than the head-body length. The tail (not regenerated) of the holotype is considerably shorter than in other specimens of comparable size. In all, the head length varies from 22 percent to 25 percent of the head-body length, and the head width is from 65 to 71 percent of the head length. The legs of adults may overlap to the extent of the length of two costal interspaces or may fail to overlap by one and one-half costal interspaces. The most variable feature of the paratypic series is in coloration. The reddish dorsum is often a most conspicuous feature and the underside of the tail may occasionally be similarly colored but is never marbled as in *goebeli*. In several of the very largest specimens traces of a series of irregular light spots may be noted in a ventro-lateral position. The chin and throat in a few individuals is spotted with white.

Discussion.—The relationship of this new form to *goebeli* is fairly

obvious. Only *rex* is sufficiently close geographically to suggest other relationships. But in possessing the long legs of *goebeli*, in approximating it in maximum adult size and in its vertical distribution it is almost identical with *goebeli*. It may be noted at this time that the ten largest specimens of this new form range in total length from 102.7 to 131.2 mm. as compared with 108 to 123 mm. in *goebeli* and but 85 to 99 mm. for *rex* (data for the last two from Schmidt).[1] In vertical range *goebeli* extends 2400 to 3200 m., whereas *rex* occurs only at elevations above 3100 m. There is reason to suspect that *exspectata* is restricted to the southeastern highlands of Guatemala, an area in which no elevations about 2600 m. are encountered.

Taylor[2] and Baird[3] both concur in assigning *rex* and *goebeli* to the *leprosa* group and *exspectata* would by *fiat* have to be similarly allocated. It is worthy of note, however, that both with regard to the character of the "bicuspid" premaxillary teeth in the males and on geographic grounds, *rex* and *exspectata* (I have not had access to males of *goebeli*) would seem to fit into the *gadovii-smithi* groups. Baird[4] is extremely vague as to the significance of the "bicuspid" tooth type. It may well be of no phylogenetic significance. At the same time it is conceivable that evolution in the genus has been centripidal. Thus the *leprosa* group may have been split into two divisions, one more northern in Mexico and the other in Guatemala, by the more specialized and presumedly more recently evolved *gadovii* group which centers somewhat more south in Mexico than the *leprosa* series. *Pseudoeurycea barbouri* (Schmidt) from Honduras is too poorly known to be fit into any phylogentic scheme at this time.

Ecology.—The University of Michigan series were all secured in late March from either within or from beneath damp, rotten logs in a broadleaf forest. Those taken from within logs were occupying the burrows of wood-boring beetles, the surrounding wood temperature of which varied 11°-13.5° C. At that time conditions in the Soledad Grande region were extremely dry. In addition to gravid females, a clutch of two dozen eggs guarded by a female was also secured. The embryos in these eggs were well developed with well formed legs. They will be treated in greater detail in a forthcoming paper. Juveniles of the year were also taken at this time, the smallest measuring but 34 mm. total length.

On April 8 of the same year Mr. Luis de la Torre returned to the type locality and secured a portion of the paratypic series. His collection also contains gravid females, a clutch of eggs and juveniles, the smallest of which has a total length of 33 mm. In the same vicinity he also secured a few specimens from bromeliads well above the ground. To my knowledge this is, with the exception of a single specimen secured by Schmidt,[5] the first Guatemalan *Pseudoeurycea* to have been taken in the bromeliad environment.

Extending from Guerrero in Mexico southward into Costa Rica is a

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[1]Schmidt, Karl P., Guatemalan Salamanders of the Genus Oedipus, Zool. Ser. Field Mus. Nat. Hist., 20, 17, 1937: 165.
[2]Taylor, Edward H., The Genera of Plethodontid Salamanders in Mexico, Pt. 1. Univ. Kansas Sci. Bull., 30, 1, 12, 1944: 209.
[3]Baird, Irwin L., An Anatomical Study of Certain Salamanders of the Genus Pseudoeurycea. Univ. Kansas Sci. Bull., 34, 1, 6, 1951: 258.
[4]*op. cit.*
[5]*op. cit.*: 164.

complex of toads which has been known as *Bufo coccifer*. Described originally from Costa Rica by Cope,[6] the species has since been reported from Honduras by Carr,[7] from Mexico by Smith and Taylor,[8] and I found it the common toad on the southeastern highlands of Guatemala.

This complex may be characterized as a group of small to moderately sized toads, with a full, well-developed complement of cranial crests, a naked tympanum, possessed of relatively small ovoid parotoids, with the dorsum covered with a moderate number of small warts which are conspicuously concentrated in all forms in the scapular region, and lacking any distinctive characters on the hands and feet. Superficially it resembles the *valliceps* complex from which it is readily distinguishable through the absence of a well developed lateral line of warts.

Examination of specimens from various parts of its range reveals that "*coccifer*" as now known must be broken down into a chain of species or at least subspecies. The Mexican population is readily distinguished from the Costa Rican population through its greater degree of dorsal wartiness, its flattened rather than spinous warts, and by its somewhat narrowed head. Inasmuch as most of the Mexican material is in the hands of Dr. Edward Taylor of Kansas University, I leave the status of that population up to him. Whether or not the Costa Rican, Honduranian, and Guatemalan populations are conspecific is questionable. There seem to be some slight differences between the first and last (I have not had access to Honduranian specimens), but until material of comparable preservation is at hand it seems best to regard these populations as the same.

Some years passed Schmidt and Stuart[9] called attention to a peculiar toad from central Guatemala. Owing to scanty material at that time, they applied Werner's name *microtus* to the specimens rather than affixing a new name to it. It may be noted that Werner's description is sufficiently vague as to be applicable to practically any moderately sized toad in northern Central America. Reexamination of the type may reveal that Werner was naming the Honduranian and Guatemalan populations of "*coccifer.*" In 1952 I collected in several localities in southeastern and central Guatemala specimens of toads which are undoubtedly conspecific with the beast mentioned by Schmidt and Stuart. A comparison of this new material with Guatemalan, Mexican, and Costa Rican "*coccifer*" reveals that a new name for this population is indicated. I accordingly dedicate it to my good friend Señor Jorge A. Ibarra, Director of the Museo Nacional de Historia Natural de Guatemala. It may be known as

Bufo ibarrai new species

Holotype.—University of Michigan, Museum of Zoology No. 108000. An adult male collected by L. C. Stuart on the night of June 19, 1952.

Type locality.—Oak-pine zone at Aserradero San Lorenzo (about 12

[6]Cope, E. D., Fourth Contribution to the Herpetology of Tropical America. Proc. Acad. Nat. Sci. Philadelphia, 1866: 130.

[7]Carr, Archie F, Jr., Outline for a Classification of Animal Habitats in Honduras. Bull. Amer. Mus. Nat. Hist., 94, 1950: 580.

[8]Smith, Hobart M and Edward H. Taylor, An Annotated Checklist and Key to the Amphibia of Mexico. Bull. U. S. Nat. Mus., 194, 1948: 44.

[9]Schmidt, Karl P. and L. C. Stuart, The Herpetological Fauna of the Salama Basin, Baja Verapaz, Guatemala. Zool. Ser. Field Mus. Nat. Hist., 24, 1941: 238.

air-line kilometers slightly east of north of Jalapa), Department of Jalapa, Guatemala. Elevation, 1725 m.

Paratypes.—University of Michigan, Museum of Zoology Nos. 106806 (10), 106807 (3) collected in the same vicinity as the holotype by L. C. Stuart on the nights of June 17-19. Chicago Natural History Museum No. 68711 collected "4 mi. northeast of Volcán de Jumay" (this is in the immediate vicinity of the type locality) by Luis de la Torre in late May, 1952.

Diagnosis.—A *Bufo* of the *coccifer* complex distinguished from the typical form by its much greater size, comparatively larger tympanum, stronger development of all cranial crests, less warty dorsum, and smooth rather than tuberculate skin between the dorsal crests in the interocular region. Comparative measurements of the two are almost identical.

Description of holotype.—A toad of moderate size. Head to angle of jaws slightly less than one-third of the head-body length, head length 75 percent of head width. Head with a full complement of crests. Cranial crests commencing at the level of the nostrils, flaring outwards posteriorly, their inner margins forming an almost straight line; conspicuously thicken at the junction of the preorbital crest which extends downward to below the center of the eye; continuing posteriorly without sharp angles, curving gently behind the eye and again curving backwards to join the parotoid glands. Well developed parietal crests branching from the supraorbital portion of the main head crest anterior to the posterior margin of the eyelid and forming a 45 degree angle with the mid-dorsal axis of the body. Postorbital crests of development about equal to that of the preorbitals and like them extending down to below the center of the eye. Supratympanic crests greatly thickened and strongly overhanging the tympanum. A low, flat rostral ridge. Area around nostrils swollen. Loreal region concave. A horny ridge above horny margin of upper lip extending from the angle of the jaws to the loreal region. Snout shorter than length of upper eyelid. Parotoids small but well formed, ovoid in outline, and their greatest length either slightly longer than or slightly shorter than the upper eyelid. Tympanum conspicuous, its vertical diameter slightly more than half the length of the upper eyelid. A pair of slightly flaring, moderately developed ridges in the scapular region. Dorsum covered with small, scattered, conical but rounded (not spinous) warts; these increasing in size and in numbers laterally and shading gradually into the granules of the ventrum. Warts on limbs more spinose in character; those on the upper surfaces of the fore-arms and lower legs most conspicuous.

Tongue about twice as long as its greatest width, rounded behind, and free over half its length. Vocal slits conspicuous. Choanae well forward, almost ovoid in outline, the distance between them somewhat more than three times their greatest diameter.

Outer metacarpal tubercle about twice the size of the inner; neither more than moderately developed. First finger longer than second; third by far the longest. Palmar tubercles conical; subarticular tubercles either double or greatly broadened. Breeding pads on fingers I and II.

Legs (coccyx to base of inner metatarsal tubercle) 87 percent of head-body length. Toes III and V about one-third webbed on the sides towards the fourth toe. Second toe about one-half webbed on the third

toe side. Inner metatarsal tubercle conspicuous, horny, somewhat flattened, conical in outline, and about one-quarter of its distal end free. Outer metatarsal tubercle conspicuous but small and low.

The ground color (following preservation in formalin and spirits) is a pale yellowish gray mid-dorsally. This color becomes more and more yellow laterally and shades gradually into the pale yellow of the ventrum. The arms and legs are similarly somewhat grayer above and more yellowish below. The tops of the cranial crests are light brown. Between them in the nasal, supraorbital, and parietal regions are irregular markings of brown outlined with black. A pair of slightly darker spots are barely visible on the inner side of the upper eyelids. A narrow light line extends from the rostrum to the anus; this line broadened and diffused in the scapular region. On either side of this in the scapular and mid-body region are irregular, black-outlined, brown markings which become faded posteriorly. Parotoids a somewhat brighter yellow than body. The upper surfaces of both arms and legs with indistinct grayish spots or crossbars, one such marking on the lower and upper arms and upper legs and two on the lower legs. Undersurfaces pale yellow with very indistinct grayish reticulations on the chest and belly.

Head-body length, 75.5 mm.; head length (snout to jaw angle), 22.0 mm.; head-width (at jaw angles), 28.8 mm.; upper eyelid, 9.8 mm.; eye to tip of snout, 9.5 mm.; tympanum, 5.0 mm.; parotoid (average), 9.4 mm.; hind leg (coccyx to base of inner metatarsal tubercle), 65.5 mm.

Variation.—Among the ten paratypic males one finds no morphological variation of significance. The length of the hind leg varies from 79 to 90 percent of the head-body length, the head length from 75 to 85 percent of the head-width, and the head length from 29 to 31 percent of the head-body length. The only conspicuous variation is in the coloration, and this is a variant of quantity rather than quality, for the dark spotting and reticulations of the dorsum and ventrum respectively may be greatly intensified but are never more widespread than in the holotype. These males vary in head-body length from 67.0 mm. to 80.3 mm.

The four females in the paratypic series show little or no morphological differences from the males with the possible exception of comparatively slightly smaller parotoids. Their warts, too, are more spinose than those of the males and these are neither so large nor so numerous on the flanks as in the males. The main variant is in pattern. Though essentially that of the males, the dark spotting on the dorsum is somewhat more widely distributed and breaks off rather sharply dorso-laterally to leave a more or less immaculate light stripe that commences at the parotoids and extends posteriorly, diffusing in the groin region. This is bordered below by a dark band that is fairly regular above but irregular below. The females are somewhat larger than the males, varying from 80 to 88 mm. in head-body length.

Discussion.—The most conspicuous difference between this form and *coccifer* is in size. Of eleven breeding males in the type series the smallest has a heady-body length of 67.0 mm., whereas the largest breeding male of a series of *coccifer* from Esquipulas, Guatemala measured but 52.8 mm. The mean head-body length of the males in the type series is roughly 75 mm. as compared to roughly 48 mm. in the Esqui-

pulas series (59 specimens). The females are comparably larger than the males in both forms.

Aside from size, *coccifer* in over-all appearance is more spiney than *ibarrai* and its warts are more spinose. Furthermore there is less concentration of the warts on the flanks in *coccifer* though the upper surfaces of both arms and legs are more warty in this latter. In color *coccifer* is immaculate below and somewhat more intensely spotted above. Mertens[10] presents an excellent photograph of the dorsal coloration typical of the northern *coccifer*.

With regard to size, there is some reason to believe that this character may not be genetic. A fine series of specimens like typical *coccifer* in all respects was secured at Jalapa at almost the same time the type series of *ibarrai* was taken at San Lorenzo. Though the two localities are but 12 kilometers apart, Jalapa lies some 300 m. below San Lorenzo. The Jalapa series of breeding males averaged some 10 mm. greater head-body length than the *coccifer* series from Esquipulas which lies 500 m. below Jalapa. Thus the size differences could conceivably be environmental. At this time I am unwilling to pass judgement on the Jalapa series. It is possible that they may prove to represent an intergrading population between *coccifer* and *ibarrai*.

Distribution.—This new species appears to be restricted to higher levels of the oak-pine belt of southeastern and central Guatemala. Aside from the type series I have a single specimen from 1500 m. on the south slopes of the Sierra de las Minas (Finca Bucaral) and another from the Salamá Basin which has been noted previously. These, it will be noted, are not designated paratypes. Though *coccifer* enters this same belt in Guatemala, it does not appear to ascend to such high elevations and may indeed prove to be restricted to the southeast with *ibarrai* replacing it in central Guatemala. It may be noted that between El Salvador and the Isthmus of Tehuantepec, despite fairly intensive collection, no representative of the *coccifer* series is known from the Pacific versant. It is indicated, therefore, that the complex may have geographic continuity or near-continuity through the subhumid Motagua, Negro, and Grijalva valleys of central Guatemala and Chiapas, a pattern that is known to obtain in certain other reptilian and amphibian species (especially *Hypopachus championi* and *Hypopachus maculatus* and in *Sceloporus squamosus* and *Sceloporus carinatus*).

While collecting in the oak-pine zone in the vicinity of Jalapa in 1952, I secured a medium-sized species of *Hyla* belonging to the *eximia* group. A study of this material reveals that it warrants description as a new species. For my colleague, Dr. Charles F. Walker of the Museum of Zoology, University of Michigan, who has been more than patient in aiding me with problems on amphibiology, I name this frog.

Hyla walkeri new species

Holotype.—Museum of Zoology, University of Michigan, No. 106817. An adult male collected in a marshy pasture at Aserradero San Lorenzo (12 kilometers [straight line] slightly east of north of Jalapa), Depart-

[10]Mertens, Robert, Die Amphibien und Reptilien von El Salvador. Abbhand. Seneken. Naturforsch. Gesell., 487: 1952: taf. 10, fig. 52.

ment of Jalapa, Guatemala at 1725 meters. Collector, L. C. Stuart; date, June 18, 1952.

Paratypes.—Museum of Zoology, University of Michigan, Nos. 106815-16, 106818-19; data as for holotype.

Diagnosis.—A medium-sized *Hyla* belonging to the *eximia* division of the *eximia* group (posterior surface of thighs not marbled or spotted). Readily differentiated from *Hyla arboricola* Taylor, its closest relative, by its much shorter legs, more pointed snout, and more underslung lower jaw.

Description of holotype.—Head (tip of snout to posterior edge of exoccipital) slightly shorter than broad (at jaw angles). Eye longer than its distance from the nostril but considerably shorter than its distance from the tip of the snout. Tympanum a little less than two-thirds as broad as eye. Snout narrowly rounded. Surface of head slightly convex. Nostrils elevated. Canthus marked by a rounded but well-defined edge. Sides of snout descending obtusely from surface of head. Loreal region depressed. Upper eyelids moderately prominent but their limits ill-defined. Snout rounded in lateral profile and distinctly overhanging lower jaw. A moderately-developed supratympanic fold commencing at the posterior corner of eye and continuing back to above arm insertions. Skin on the upper surface of the head, arms, legs and body smooth.

Lower jaw somewhat more broadly rounded than upper jaw. Skin of chin and throat smooth. Vocal sack large, extending posteriorly to the level of the arm insertions. Belly coarsely granular, this granulation extending up onto the sides of the body in diminishing intensity and merging gradually with the smooth skin of the dorsum.

Tongue ovoid; about one-third free; slightly notched behind. Vomarine teeth 5/6; situated on two ridges somewhat longer than broad and lying between the choanae. Vormarine ridges extending backward obliquely and smaller than the choanae. Vocal slits large and situated laterally just in front of the angle of the jaws.

Arms moderately stout. Fingers with but a mere trace of a web. Subarticular tubercles prominent. Discs on fingers II, III, and IV about three-quarters as broad as the tympanum. Discs of thumbs greatly reduced and not apparent as such. Skin of undersurfaces of the arms more wrinkled than granular. An ill-defined row of small tubercles along the lower posterior edge of the fore-arm. A well-defined dorsal wrist-fold.

Legs short and moderately stout, the heel reaching only to the tympanum when legs are adpressed. Skin of the underside and lower posterior surface of the thigh granular; this granulation diminishing in intensity distally and disappearing before reaching the knee. A well developed heel-fold. A prominant tarsal fold. A very small outer metatarsal tubercle. Web between toes V and IV incised to level of base of antipenultimate phalanx of V and joining toe at that point though a dermal fringe extends from there almost to the base of the terminal pad; outer side of toe IV webbed to base of preantipenultimate phalanx; inner side webbed to distal end of basal phalanx. Web between toes IV and III incised to level slightly below distal end of basal phalanx and attached to outer side of toe III at the distal end of basal phalanx.

Web between toes III and II incised to level half way down the basal phalanx of toe II; attached to inner side of toe III at distal end of basal phalanx and carried to terminal disc as a dermal fringe on outer side of toe II. A mere trace of a web between toes II and I and again carried distally as a dermal fringe to the terminal disc on the inner side of toe I. Terminal discs of all toes smaller than those on fingers II, III, and IV. Subarticular tubercles all well developed.

Ground color (in spirits) of upper surfaces of head, body, arms and legs a bluish to purplish gray. On either side in scapular region the ground color enclosed by a narrow black line to give impression of two dark elongate spots. Similar elongate spots, somewhat darker, in pelvic region and on either side of these, smaller, rounded spots. Two dark small round spots above anal region.

On sides of head a narrow black line commences anterior to the nostril on either side, passes through the nostril and continues to the eye. At the posterior corner of the eye this dark line commences again but is considerably broader. It continues backwards above the arm insertion and then diffuses rapidly towards the ventral surface leaving only its upper portion distinct and carrying backwards to the groin. Behind the eye this lateral dark streak is bordered above by a narrow, diffused, light line that becomes more evident posteriorly on the body. Below the dark streak on the head to the level of the arm insertions the ground color is greatly lightened to produce a broad, light border down to the edge of the lip which is again very dark.

The ground color of the upper surfaces of the arms is bordered laterally by a diffused light line, below which lies a narrow dark line that diffuses ventrally. A narrow dark band marks the wrist-fold. Upper surfaces of the hands darkened by a concentration of melanophores, a condition that extends out onto the fingers, especially III and IV.

The dorsal ground color is restricted to the central portion of the upper surfaces of the thighs. This is bordered both anteriorly and posteriorly by a dark line that diffuses ventrally and is most distinct above the knees. The lower limits of the dorsal ground color are marked by a diffused dark line posteriorly and by a light line, below which lies a diffused dark line, anteriorly. An inconspicuous, irregular, dark spot on the dorsal surface of the lower leg in the mid-leg region. Heel black with a light proximal border. The feet and toes like the hands and fingers are peppered with black.

In life the species is extremely brightly colored. I quote the following from my field notes which was a composite description of the type series:

"Above a bright, penetrating, very green green which shows through the dark gray dorsal spots. . . . This same shade also on the upper surfaces of the fore and upper arms, thighs, lower legs and narrowly on the tarsus. Starting at nostril and continuing backwards through eye and across tympanum a very black line that becomes increasingly lighter posteriorly and which on sides of the body becomes gray, then dirty green, and eventually a bright yellow smear in the groin region. This line bordered above by a lighter green than that of dorsum, giving appearance of a light upper border. Below diffusing gradually into white of belly. Upper lip below dark band a yellowish green. On outer sides of arms the green of the upper surfaces bordered by a diffused

gray stripe. A somewhat more distinct narrow, dark gray stripe borders the green upper surface of the knee, lower leg and tarsus on the outer side. Some gray flecks around anus. A narrow dark line around wrist and ankle. Upper surfaces of metatarsus and toes as well as sides and lower surfaces of thighs a bright yellowish orange. Under surfaces of lower legs somewhat lighter, as are the under surfaces of the fore-arms and hands. Vocal sac as bright yellowish orange. Chest and belly white.''

Comments.—In all essential details the four paratypes are in accord with the holotype. Table 1 presents the more important measurements for the type of series.

TABLE 1

Essential Measurements for the Type Series of *Hyla walkeri* in Millimeters

Number	Head-body to anus	Anus to heel	Foot	Hd. lg. / Hd. wd.	Eye	Tym-panum	Snout	Adpressed Legs: Heel to
106815	31.1	25.4	22.0	1.0—	2.8	1.7	3.9	Posterior edge eye
106816	31.8	27.4	22.5	1.0—	3.1	1.6	4.1	Tympanum
106817	34.4	26.1	23.0	1.0—	3.2	2.0	4.5	Tympanum
106818	30.5	25.0	21.2	1.0—	2.9	1.4	4.1	Posterior edge eye
106819	31.8	27.0	22.5	1.0—	3.0	1.6	4.5	Posterior edge eye

This new species is placed in the *eximia* division of the *eximia* group on the basis of the coloration of the posterior surface of the thighs which is neither marbled nor spotted as is true of the *euphorbeacea* division. This latter division is represented, incidentally, in Guatemala by *Hyla bocourti* (Mocquard) which is known only from the oak-pine zone of Alta Verapaz.

The species is obviously most closely related to *Hyla arboricola* Taylor. From *lafrantzi* and *wrightorum* it is readily differentiated on the basis of its much shorter leg, from *regilla* by its smooth dorsum, from *cardenasi* by its much longer snout, from *eximia* by its shorter leg, somewhat less extensive webbing between the toes, and less bold lateral pattern, and from *arboricola* by the characters noted in the diagnosis.

The seven hundred kilometer gap between *bocourti* and this new form and the next closest member of the *eximia* group (*euphorbeacea* in Oaxaca, Mexico) poses a nice geographic problem. It is not improbable, however, that future collecting in the oak-pine zone of central Chiapas and of northwestern Guatemala will reveal a greater continuity in the range of the group.

This little species was heard calling on only two occasions, the nights of June 17 and 18, 1952 at San Lorenzo. Both nights were overcast and cold, with a fine drizzle falling and a heavy mist settling in the depressions. On the same nights *Bufo* and *Hypopachus* were calling in small numbers and a few ranas were abroad. The species was heard at only one site, a damp, sloping pasture in which the water table lay at the surface and water was draining as a sheet into a nearby gully. The pasture was extremely hummocky as a result of cattle pasturing in

the area. The specimens were located amongst the short, new grass on the hummocks and because of their color were difficult to locate. Though a number were heard calling, their calls were widely spaced and the species was extremely wary, ceasing to call entirely as their territories were approached. The call was a moderate pitched, fairly rapid, "a-a-a-*a*", reminding one of a small boy imitating the firing of a tommy-gun. There were always four notes to a single call with the accent falling on the final "a." The single calls were repeated three or four times running and were followed by a four to five minute pause between outbursts.

Recent investigations in Central America have revealed what may prove to be a very distinct group of hylids which are probably stream forms and which are known from Guerrero, Mexico to Costa Rica. Some of these, the males at least, possess thickened lateral or lateroventral glands of varying degrees of conspicuousness. These species have been included in the genus *Ptychohyla* Taylor. At present *P. adipoventris* and *P. bogerti* are assigned to the genus. If these glands are of phylogenetic significance, then *Hyla spinipollex* Schmidt, *Hyla euthysanota* Kellogg, and very probably *Hyla rozellae* Taylor must also be assigned to *Ptychohyla*. I further suspect that such species as *Hyla uranachroa* Cope, *Hyla ruficolis* Taylor, *Hyla alleei* Taylor and *Hyla salvadorensis* Mertens should be similarly allocated.

Several difficulties arise in connection with the establishment of the genus *Ptychohyla* as a valid entity. First, most of the species of this group are rare in collections especially insofar as individuals secured throughout the year are concerned. Second, from what material is available, it appears that only males possess the lateral glands. Third, horny adspersities are present on the thumbs of some of the species and all indications point to these being seasonal as well as being confined to adult males. And fourth, the presence of adspersities in breeding males only, suggests that the glands are similarly seasonal as well as adult character. *Hyla rozellae* has heretofore been known from only an adult (?) male and female and juveniles and the adult (?) male is without glands. I have recently had access to specimens which are unquestionably *rozellae* and the males possess the glands. Until more is known of these several features the status of *Ptychohyla* cannot be settled, but because we are dealing with a group of obviously closely related species, it seems proper to retain the name if for no other purpose than convenience. I have previously taken this same stand in regard to the snake genus *Trimetopon*.[11]

Regardless of the status of the genus I have for some years been aware of a diminutive Guatemalan frog with lateral glands. These are in the collections of the Museum of Zoology and the Chicago Natural History Museum and form a part of the magnificent collections assembled from south Guatemala in 1934 by Mr. K. P. Schmidt of the latter institution and by his brother, the late Franklin J. W. Schmidt. Two more recent specimens in the Museum of Zoology collections were secured by Mr. H. O. Wagner in Chiapas, Mexico. Study of this series reveals that they are new to science and I accordingly name them for their first collectors,

[11]Stuart, L. C. A New Trimetopon (Ophidia) from Guatemala. Proc. Biol. Soc. Washington, 62, 1949: 165.

Ptychohyla schmidtorum new species

Holotype.—Chicago Natural History Museum No. 20755. An adult male collected at Finca El Porvenir (17 air-line kilometers due west of San Marcos), Department of San Marcos, Guatemala. Elevation, unknown but El Porvenir terrain includes elevations ranging from about 500 m. to possibly 2000 m. Collector, K. P. Schmidt; date, March 2, 1934. Between March 1 and March 3 of 1934 Schmidt is known to have worked at elevations ranging from 1700 m. to about 2200 m.[12]

Paratypes.—Chicago Natural History Museum Nos. 20755, data as of holotype and 20761, collected at the type locality on February 26, 1934 by K. P. Schmidt; Museum of Zoology, University of Michigan No. 80918, data as of holotype and 105429-30 collected by H. O. Wagner during April, 1950 at Finca Irlanda, Chis., Mexico. All are males.

Diagnosis.—A small *Ptychohyla* distinguished from other members of the genus and from species not now assigned to the genus but which I suspect should be so allocated by the close proximity of the lateroventral-ventral glands, by the absence of a tarsal fold, and by the less extensive webbing of the fingers. The most conspicuous gross feature of the beast is the coloration of the head (to be described below) which gives the appearance of a distinct white spot below the eye.

Description of holotype.—Head (tip of snout to posterior edge of exoccipital) slightly longer than broad (at jaw angles). Eye longer than its distance from the nostril but shorter than its distance from tip of snout. Distance between nostrils slightly less than their distance from eye. Tympanum slightly less than one-half the length of the eye and almost equal to its distance from posterior margin of eye. Surface of head flat, canthus rounded and sides of snout descending obtusely to mouth. Nostrils slightly elevated. Snout rounded. Upper eyelids about as wide as the distance between them. Supratympanic fold definite only over tympanum, flattening out and merging with skin in back of eye and posteriorly towards arm insertions.

Lower jaw broadly rounded, and conspicuously overhung by upper jaw. No evidence of external vocal sack.

Skin of dorsal surfaces of head and body smooth. Commencing about half way down on the sides and extending well onto the belly on either side is a large smooth gland which appears like thickened skin. These glands extend from the axilla to the groin. On the chest they almost touch mid-ventrally and are barely separated by slightly granular skin. Posteriorly on the belly they diverge and are separated by a triangular patch of normal, coarsely granular skin that continues granular between the legs and onto the under surfaces of the thighs almost to the knee. The skin anterior to the gland on the throat and chin is finely granular. The anterior margins of the glands are sharply delimited and give the appearance of fold that extends laterally to and around the posterior portions of the arm insertions.

Arms normally developed. A slight thickening of the skin on the under surface of the fore-arm produces a barely visible ridge (somewhat more evident in some of the paratypes). A wrist fold on the dorsal

[12]Elevations given for type localities of *Oedipus franklini* and *O. flavimembris* respectively in Schmidt, K. P. Guatemalan Salamanders of the Genus Oedipus. Zool. Ser. Field Mus. Nat. Hist., 20, 1936: 158-59.

surface of fore-arm. Fingers in order of length III-IV-II-I. A definite but very slight web between the fingers. Disc on third finger equal to tympanum, that on thumb very small. Palmar tubercles not particularly well developed. Subarticular tubercle on finger IV bifed.

Legs relatively short; when adpressed the heel reaching only to the anterior border of the eye. No evidence of a tarsal fold either inner or outer. Inner metatarsal tubercle ovoid in outline, conspicuous but not overly prominent. Outer tubercle small, circular in outline and low. Web between toes I and II narrow, incised to base of ultimate phalanx of I and attached to II at base of ultimate phalanx though extended somewhat more distally as a narrow fringe. Between toes II and III web incised to level of base of ultimate phalanx of II and attached to near distal end of ultimate phalanx of II and about half way up same phalanx of III. Web between toes III and IV incised to base of penultimate phalanx of toe IV and attached to mid-point of ultimate phalanx of toe III and base of same phalanx on toe IV. Web between toes IV and V incised to level of base of penultimate phalanx of IV and attached to IV at base of ultimate phalanx and to V near the distal end of ultimate phalanx. Discs on toes smaller than those of the fingers.

Vomarine prominences ovoid, between choanae, and diagonally placed, directed medially and posteriorly. These prominances somewhat larger than the choanae and separated from each other and from the choanae by spaces equal to about one-half their diameter. Vomarine teeth 3/3. Tongue almost circular and about filling the lower jaw. Vocal slits large and situated fairly well forward so as to be readily visible. Aside from a compound fracture of the left mandible and a simple fracture of the left upper leg, the holotype is in excellent condition and well preserved.

Ground color (in spirits) of surface and sides of head and back light brown with a purplish tinge in nasal and canthal regions and on upper eyelids. This ground color becoming somewhat lighter posteriorly and delimited laterally by the upper margin of the lateral glands. Anteriorly the boundary between the brown of the dorsum and the white of the ventrum continues forward from the edge of the glands above the arm insertions, below the tympanum and extends as a narrow margin along the edge of the upper lip. A relatively broad streak of white commences at the angles of the jaws and extends forward and upward to and including the lower eye-lid, giving the gross appearance of a light spot below the eye. A few scattered, small, white flecks on the dorsum similar to those often found in *Agalychnis*. The distal upper surface of the upper arm and the entire lower arm brown above somewhat lighter than the dorsum and fading gradually distally from the elbow out onto the fingers. A light elbow spot. Upper surfaces of the legs and feet similarly colored, the brown most intense on the lower legs. A narrow light streak across heel. Undersurfaces almost entirely immaculate white. One or two flecks of light brown on the lateral glands (see notes on paratypes below), and some scattered brown pepperings on the undersurfaces of the foot and toes.

Variation.—The paratypic series is like the holotype in all essential details. The only variation of any significance is in color. In some specimens the dorsum has a mottled appearance and the legs, especially

the lower, may be similarly mottled and much darker above than in the holotype. In several of the specimens there is a broken and somewhat diffused dark band on the lateral gland extending from axilla to groin. This gives the appearance of a light lateral stripe between the lower brown line and the ground color of the dorsum but at best it is an inconspicuous feature. Significant measurements of the type series are given in Table 2.

TABLE 2

Essential Measurements for the Type Series of *Ptychohyla schmidtorum* in Millimeters

Number	Head-to anus	Anus to heel	Foot	Hd. lg. / Hd. wd.	Eye	Tympanum	Snout
20755(type)	29.5	25.5	19.6	1.8	3.5	1.6	4.8
20755	29.0	27.0	19.1	0.99	3.7	1.5	----
20761	29.0	27.0	20.1	0.98	3.8	1.6	----
80918	29.0	25.5	19.6	0.95	3.4	1.5	4.4
105429	32.0	27.0	20.0	1.0	4.0	1.8	5.1
105430	31.0	26.5	19.9	1.0	3.8	1.7	5.1

Comments.—On the basis of our present knowledge it is difficult to say to what known species *schmidtorum* is most closely related. The lack of any trace of a tarsal fold is unique in the group. Most of the northern species that possess lateral glands have a certain amount of pigmentation in the same, as compared with the almost immaculate condition in this new form. Furthermore the northern forms tend to be more uniform in their dorsal and lateral head coloration, lacking the very distinctive light border and spot on the sides of the head. Though the southern species such as *uranachroa* or *alleei* are not known to possess glands in the males, they do possess the light lip and eye spot. I am inclined to believe that the relatives of *schmidtorum* should be sought in that direction.

Some years ago I collected on the eastern slopes of the Sierra de los Cuchumatanes a specimen of *Pituophis* which did not fit exactly the descriptions of *P. deppei lineaticollis* to which it theoretically should have been assigned. Since that time further specimens have been secured in the vicinity of Yepocapa, and examination reveals that these agree in all features with the Cuchumatán specimen upon which I have already commented.[13] In recognizing this population as distinct, I name if for my good friend Dr. Colvin Gibson who, while associated with the Panamerican Sanitary Bureau at their onchocerciasis station in Yepocapa, turned over to me a most interesting collection of amphibians and reptiles secured in that region. It may be known as

Pituophis deppei gibsoni new subspecies

Holotype.—Museum of Zoology, University of Michigan, No. 107060. A half-grown male from the Gibson Collection, secured in the vicinity

[13]Stuart, L. C. Comments on the Herpetofauna of the Sierra de los Cuchumatanes of Guatemala. Occ. Papers Mus. Zool., Univ. Michigan, 471, 1943: 23.

of Yepocapa, Department of Chimaltenango, Guatemala at 1430 meters on May 16, 1950.

Paratypes.—Museum of Zoology, University of Michigan, Nos. 107062-63, Finca El Tesoro (3 kilometers [straight line] southeast of Acatenango), Chimaltenango at 2125 meters elevation; No. 107064, Río Sobolopop (8 kilometers [straight line] west of Patzún), Chimaltenango at 2175 meters elevation; No. 107061, Río Los Positos (5.5 kilometers [straight line] northeast of Yepocapa), Chimaltenango at 1525 meters elevation ;No. 107381, Finca Recreo (4.5 kilometers [straight line] southwest of Yepocapa), Chimaltenango at 1280 meters.

Diagnosis.—A *Pituophis* of the *deppei* group readily distinguishable from its obviously closest relative *lineaticollis* through the breaking up of the paravertebral stripes on the anterior part of the body to form a series of paired, elongate spots.

Description of holotype.—A full complement of normal colubrid head shields. Rostral broader than high and curving well back onto the anterior surface of the snout; two internasals and two prefrontals, the suture between the former only about one-half as long as that between the latter; frontal about three-fourths as broad as long, its length equal to its distance from the tip of the snout; a large supraocular on either side, each as long as the frontal; two parietals as long as the frontal. Nostril between two nasals; a small loreal which is only about half as large as the preocular; two postoculars; anterior temporals 2/3; the posterior temporals poorly differentiated. Supralabials seven, the third and fourth entering the orbit; eleven infralabials, four on one side and five on the other in contact with the anterior chin shields; posterior chin shields but poorly differentiated from the adjacent gular scales. Dorsal scale formula 25-27-25-23-21; the six lowermost scale rows on either side unkeeled anteriorly, and the two lowermost alone unkeeled at the level of the anus. Abdominals, 237; subcaudals, 64; preanal undivided. Total length, 860 mm.; tail length, 41 mm.

Ground color of entire dorsum a light brown (*stratum corneum* in place). The top of the head unmarked; the ground color of the dorsum becoming light on the sides of the head and taking on a pinkish tinge on the supralabials. On the nape two parallel black spots, eight scales in length and four in width, are placed in a paravertebral position. These followed by a gap some two scales in length and then another pair of long, narrow spots of unequal length. In all, three such pairs of spots are present on the anterior part of the body. These are followed by two more pairs of similar spots, each pair being joined by a narrow dorsal saddle. There is thus produced the two paravertebral lines so conspicuous in *lineaticollis* with the exception that in *gibsoni* these lines are broken. These broken stripes extend to about the level of the forty-seventh abdominal. Following these are twenty-three dorsal blotches with light centers. Anteriorly these blotches consist of a pair of spots in the paravertebral region, connected by a dark saddle. They differ from the spots considered as a part of the broken paravertebral lines in possessing light centers. Posteriorly the dorsal blotches become more and more single in appearance and about two thirds of the way back on the body take on the appearance of a single middorsal saddle. The light centers of the blotches are gradually enlarged posteriorly. On the

tail are nine, black dorsal saddles that extend across the dorsum almost from ventral to ventral. Anteriorly on the tail these black saddles have a barely visible light center which disappears posteriorly.

Laterally on the anterior part of the body are a series of elongate blotches similar to the paravertebral blotches and alternating with the latter. They occupy the second, third, fourth, fifth and sixth or only the third to fifth scale rows. Posteriorly these blotches become more rounded and light centered. Towards the back third of the body their form becomes obscure and they gradually change into small dark spots. On the tail they are evident only anteriorly. Ventrally on the posterior part of the body are small irregular dark spots which occupy the edges of the ventral scutes and which alternate with the lateral spots. On the anterior portion of the ventrum the spots become increasingly obscure while on the tail they degenerate into occasional dark marginings on some of the subcaudals. Irregular dark spots occur also in the center of some of the abdominal scutes on the posterior half of the body.

Discussion.—Though there is considerable variation in the details of pattern in the paratypic series, the essential elements in the holotype are present in all. Variation in other characters are given in Table 3.

Aside from the breaking up of the paravertebral stripes on the fore part of the body, only minor differences separate *lineaticollis* from *gibsoni*. The former has a slightly higher average number of abdominals, subcaudals and dorsal spots than has *gibsoni*. Table 4 compares these features in the two forms.

In addition to the paratypes, all of which stem from the immediate vicinity of the type locality, this new form is known also from Nebaj, El Quiche (Museum of Zoology, University of Michigan No. 89202, noted in Table 3). What is undoubtedly this same race has been reportedly from Volcán Agua, Sacatepequez at 1800 meters by Slevin[14] and from Dueñas, Sacatepequez by Boulenger[15] and Gunther.[16] In the case of this latter specimen there is some question as to the nature of the neck stripes. Günther describes and figures them as continuous as in typical *lineaticollis*, whereas Boulenger describes them as being broken as in *gibsoni*. Dr. Parker has informed me (*in litt.*), however, that its pattern is that of *gibsoni*.

Though intergrades between *gibsoni* and other members of the *deppei* group are unknown at this time, I consider the form so close to *lineaticollis* that integration between the two may be anticipated. At present the closest known record of *lineaticollis* to *gibsoni* is one recorded by Smith and Taylor[17] from San Cristóbal, in Chiapas, México. I have not examined this specimen and it may, indeed, prove to be *gibsoni* or an intergrade between that and *lineaticollis*.

Several years ago my good friend Sr. Antonio Piloña, administrator of Finca La Gloria in the *oriente* of Guatemala, sent me a small snake the lower jaw of which had been somewhat mangled, but which in other

[14]Slevin, Joseph R. Notes on a Collection of Amphibians and Reptiles from Guatemala. I. Snakes. Proc. California Acad. Sci., 23 (26), 1939: 400.

[15]Boulenger, George A. Catalogue of Snakes in the British Museum (Natural History). London, British Museum, II, 1894: 64-65.

[16]Gunther, Albert C. L. G. Reptilia and Batrachia. *In* Biologia Centrali-Americana. 1885-1902: 124, Pl. 47.

[17]Smith, Hobart M. and Taylor, Edward H. An Annotated Checklist and Key to the Snakes of Mexico. U. S. Nat. Mus., Bull. 187, 1945: 108.

TABLE 3

Variation in Major Morphological Features in available material of *Pituophis deppei gibsoni* excepting the holotype.

Number	Sex	Labials		Oculars		Anterior Temporals	Dorsals	Abdominals	Subcaudals	Blotches	
		Supra	Infra	Pre	Post					Body	Tail
107062	♂	8	12	1	2	3	27-25-23-21	234	65	26	9
107381	♂	8	11	1	2/3	2/3	25-27-25 23-20	234	61	22	7
89202	♀	8	10/11	1	2	3	25-27-25-23-21	241	57	22	7
107064	♀	6/7	11	1	2	3	27-25-27-25-23-21	246	--	23	
107063	♀	8	11/12	1	2	4	25-27-25-23-21	242	57	25	7
107061	♀	8	11/13	1	2	4	27-29-27-25-23-21	246	63	27	9

Table 4

Comparison of the Number of Abdominals, Subcaudals, and Dorsal Saddles in *Pituophis deppei lineaticollis* and *Pituophis deppei gibsoni*

Species	Sex	Abdominals	Subcaudals	Total Ventrals	Body Saddles	Tail Saddles	Total Saddles
lineaticollis	♂ ♂ (7)	231-244 (238)	63-71 (66.5)	297-312 (305)	25-33 (28)	10-13 (11.5)	35-45 (35.5)
	♀ ♀ (2)	245-249 (247)	61-62 (61.5)	307-310 (308.5)	29-34 (31.5)	9-11 (10)	38-45 (41.5)
gibsoni	♂ ♂ (3)	234-237 (235)	61-65 (63)	295-301 (297.5)	22-26 (24)	7-10 (9)	29-35 (32)
	♀ ♀ (4)	241-246 (244)	57-63 (59)	298-309 (302)	22-27 (24)	7-9 (8)	29-36 (32)

Numbers in parentheses after sexes indicate number of specimens; in all other cases, means.
Data for *lineaticollis* includes three specimens in the Museum of Zoology, University of Michigan, four specimens listed by Stull (Stull, Olive Griffith. Variations and Relations in the Snakes of the Genus Pituophis. U. S. Nat. Mus., Bull. 175, 1940: 51) and two listed by Smith (Smith, Hobart M. Summary of the Collections of Snakes and Crocodilians Made in Mexico under the Walter Rathbone Bacon Traveling Scholarship. Proc. U. S. Nat. Mus., 93, 1943:460).

respects is in perfect condition. The snake obviously must be assigned to some genus in the *Rhadinaea* complex. Dr. E. R. Dunn suggests that it might well be allocated to *Trimetopon* and I concur with this opinion. I have already expressed[18] my misgivings as to the validity of this genus but have pointed out my reasons for maintaining its *status quo* for the present. Because of a reduction in maxillary dentition, its single postocular, and its relatively uniform rather than striped pattern, all unusual features in *Rhadinaea* but well known in *Trimetopon*, I assign it to the latter genus. It is herewith named for *don* Antonio and his good wife, *doña* Marta, my hosts at Finca La Gloria.

Trimetopon piloñaorum new species

Holotype.—Museum of Zoology, University of Michigan, No. 102635. A half-grown female collected at Finca La Gloria (about 12 kilometers [straight line] northeast of Chiquimulilla), Department of Santa Rosa, Guatemala at about 950 meters. Collector, unknown; date about July 25, 1949.

Diagnosis.—A *Trimetopon* with eight supralabials, a single postocular, two prefontals, readily distinguishable from all other forms now assigned to the genus by its very high number of ventral scutes (abdominals, 166; subcaudals, 98; total ventrals, 264).

Description of holotype.—A full complement of normal colubrid head shields. Rostral very much broader than high but visible from above. Two small internasals; two large prefontals; frontal longer than broad and longer than its distance from the end of the snout; a small supraocular on either side; parietals very large, longer than their distance from the tip of the snout. Nostril between two nasals; loreal longer than high; a single preocular; a single postocular; temporals, 1-2; eight supralabials, the fourth and fifth entering the eye. Infralabials, 9; four in contact with the anterior chin shields; posterior chin shields apparently present and much smaller than the anterior ones.

Dorsals smooth, in 17 longitudinal rows throughout the length of the body, abdominals, 166; subcaudals, 98; preanal divided. Total length, 310 mm.; tail length, 100 mm.

Maxillary teeth increasing in size posteriorly and apparently without a diastema posteriorly; 10 in number.

Ground color of the upper surface of the head white; all the upper head shields except the internasals with dark brown centers, which color in some instances blends gradually into the light ground color giving each shield the appearance of having a light border. The internasals are darkened on their lateral edges. When viewed *in toto* the surface of the head appears to be white mottled with dark brown. Laterally the supralabials are white with fairly extensive dark posterior borders; the eighth supralabial also has a dark anterior margin which blends with the brown posterior border of the seventh to produce a dark postocular spot. The remaining lateral head shields are white, mottled or flecked with dark brown. A white collar two and one-half scales in width extends across the nape from mouth angle to mouth angle. It is broken middorsally by the dark brown middorsal scale row.

[18]Stuart, L. C. A New *Trimetopon* (Ophidia) from Guatemala. Proc. Biol. Soc. Washington 62, 1949: 165.

Ground color of the body and tail dark brown. The lower half of the lowermost scale row is white, and the center of each of the other scale rows is flecked with white with the exception of the middorsal row which is solid dark brown. This white flecking becomes progressively less intense from scale row two towards the middorsal row. On the anterior part of the body a stripped pattern appears to obtain but this impression of stripping disappears posteriorly. The upper half of scale row three and the lower half of four are somewhat darker than the others, thus producing a barely visible, dark stripe in that region. The underparts are immaculate white except for the lateral edges of the abdominals and subcaudals which are flecked with dark brown, a condition that becomes progressively more intense posteriorly.

Discussion.—On the basis of this single specimen, little can be said concerning its position in the 'genus'' *Trimetopon*. In pattern it most closely resembles *Trimetopon posadasi* Slevin of southwestern Guatemala, while in structural features it appears to be close to *Trimetopon hannsteini* Stuart of the same general region. It is not improbable that, if there is anything in the way of natural groups in the genus (a condition that I seriously doubt), *piloñaorum* may be placed in the *hannsteini-veraepacis-posadasi* chain of northern Central America in much the same way as the southern Central American forms may form the *barbouri-viquezi-slevini* and *gracile-simile* groups.

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PROCEEDINGS
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APPARENT NEOTENY IN THE SAW-WHET OWLS OF MEXICO AND CENTRAL AMERICA

By Marjorie A. Briggs*

At present two species of saw-whet owls are recognized, namely: the spotted saw-whet owl, *Aegolius acadicus,* and the unspotted saw-whet owl, *Aegolius ridgwayi.*

Aegolius acadicus has immature and adult plumages, in both of which the wings and tail are profusely spotted. *A. a. acadicus* (Gmelin) breeds from southern Alaska east to Nova Scotia and south through the mountains of southwestern United States and Mexico to Querétaro and Veracruz (Friedmann, Griscom, and Moore, 1950, p. 150). *A. a. brooksi* (Fleming) is resident on the Queen Charlotte Islands.

Aegolius ridgwayi lacks spotting on the wings and tail. Its three subspecies, each known from a single specimen, are *ridgwayi* of Costa Rica, *rostratus* of Guatemala, and *tacanensis* of extreme southern Chiapas. Rather remarkably, these forms have never been found in the typical adult plumage, and Griscom (1930, p. 2) suggests that they may never acquire it. The question immediately comes to mind whether the spotted and unspotted forms may be geographic representatives of the same species. Peters (1940, p. 174) says: "*A. rostrata* and *A. ridgwayi* are certainly conspecific, in fact it is quite probable that they are conspecific with *acadicus.* Until it is definitely known that they have an adult plumage similar to that of *acadicus* I prefer to maintain them as a specific entity."

As one comes progressively southward the extent of spotting gradually diminishes and vanishes. Secondly, for some unknown physiological reason, the southern forms apparently never acquire a typical adult plumage. Are we justified, however, in considering forms known only from immature stages to be specifically distinct from those which have an adult plumage as well?

We may profitably study the case of the several larval salamanders or axolotls of the family Ambystomidae found in the mountain lakes of Mexico and elsewhere. These forms usually retain their gills through life and breed in the larval state. Smith and Taylor (1948, p. 6) in a key to the Mexican Ambystomidae list two genera which are neotenic in nature, both from the southern part of the plateau of Mexico. They are *Bathysiredon,* presumably incapable of transformation, and *Siredon,* capable of artificial transformation, or in the case of one of its species, at least occasional natural transformation may occur.

A great deal of experimental study relating to the role of the thyroid gland in metamorphosis has been made on the American axolotl, *Ambys-*

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toma tigrinum. An excellent discussion is given by Lynn and Wachowski (1951, p. 123-168). They say the "failure to metamorphose in nature has been variously ascribed to deficiency in the animal's thyroid secretion, exceptional tissue insensitivity to the thyroid influence, or impairment of the thyrotrophic function of the pituitary." The latter hypothesis is favored at present. Whatever the cause may be, the fact remains that cold-blooded vertebrates may be artificially induced to metamorphose through the administration of thyroid extract, iodine, or iodine compounds. The failure of amphibians to reach adult status is due then to either direct or indirect malfunction of the thyroid.

At no time have modern herpetologists taxonomically separated a form unless it had structural differences also. Refer, for example, to E. R. Dunn's paper (1940) on the races of *Ambystoma tigrinum*. For each race a diagnosis is given based on external coloration and pattern, structure, and method of egg laying. Prevalence of neoteny is also given for each subspecies, but it is not diagnostic in itself.

Benoit (1950, p. 296) summarizes the effect of thyroid extract admisistration in birds, and says that during the moult the thyroid is very active. An artificial moult may be induced by injections of thyroxin. Furthermore, the thyroid exercises an influence on the shape and pigmentation of the feathers. Conversely, thyroidectomy brings about a halting or strong retardation of the growth of the feathers along with the augmentation of melanin and the dimunition of red pigments.

It seems not at all impossible that these owls may also exhibit neotenic types. The persistence of immature characters into adulthood is probably a not too rare evolutionary phenomenon and is not necessarily a criterion of primitiveness. With the above in mind, I consider all forms of *Aegolius acadicus* as conspecific.

In a collection of skins from Oaxaca, which I am presently studying, a saw-whet owl in immature plumage proves to be an extremely interesting specimen. This bird in wing and tail markings is exactly intermediate between the spotted birds to the north and the unspotted ones to the south. Its characters further bridge the gap between the northern and southern population, hitherto considered specifically distinct.

The history of our knowledge of this group is interesting. In 1905, Alfaro discovered the very distinct *ridgwayi* in Costa Rica. From farther north, in Guatemala, Griscom (1930) described *rostratus*, a form whose characters help connect *ridgwayi* to *acadicus*. Then in 1947, Moore described *tacanensis* from the Mexican-Guatemala boundary with characters further uniting the tropical forms to the northern *acadicus*. The specimen from Oaxaca completes the chain linking the tropical races with the north temperate *acadicus*. I describe it as

Aegolius acadicus brodkorbi, new subspecies

Type.—University of Florida, no. 1854; male; Amatepec, Oaxaca, Mexico; May 12, 1949; Mario del Toro Avilés, collector.

Superciliary region, forehead, and anterior suborbital area to chin white. Posterior suborbital region and auricular ruff grading rather abruptly from inconspicuous white at base of feathers to Bister (color names in capitals are from Ridgway, 1912). Marginal area around eye and lores black. Pileum and entire upperparts uniform Prout's Brown

to Bister with slight chestnut tint similar to coloring of auricular region. Ruff feathers similar in coloring with a few buffy spots. Wings Clove Brown. Outer web of first, third, fourth, and fifth primaries with two to four small buffy white spots, the sixth having one small spot. Second primary lacks spots and is sinuate on outer web. All primaries narrowly edged with pale buffy. Outer web of secondaries without spots. Inner webs of secondaries and all primaries except outer three with three or four buffy spots. Alula narrowly edged with white. Under wing coverts Cream-Buff (similar to belly) and mottled with brown. Rectrices Clove Brown, with small whitish spots in three consecutive rows, and tipped with extremely narrow band of white, enlarging progressively from outer to middle rectrices to form a white spot at tip of distal end of inner web. Lower throat with band of Prout's Brown mixed with Cinnamon. Chest Saccardo's Umber grading posteriorly to Cream-Buff. Belly, flanks, and legs Cream-Buff, becoming Cartridge Buff on crissum. Feathering of hind toe and outer toe Cartridge Buff, extending practically to claw. Middle toe bare 4.5 mm. from claw. Inner toe with last 6 mm. bare, feathered for 11 mm. No pin feathers seen. Bill blackish, with culmen slightly lighter, and gonys and tip of maxilla yellowish. Iris yellow. Skin of toes yellowish. Claws brown, paler at base (dried skin).

Wing 142, tail 72.5, culmen from cere 12.5, depth of bill at cere 10, tarsus 24.5, middle toe 18.5, claw of middle toe (from skin) 10.5 mm.

Characters.—Differs from juvenile plumage of *Aegolius acadicus acadicus* (Gmelin) in having a greater extent of white on face (superciliary region, forehead, anterior suborbital area, and chin); upperparts with no trace of the whitish or buffy spotting especially prominent in the scapular region of *acadicus;* under wing coverts darker like *brooksi;* outer web of primaries with less white; inner web of outer three primaries plain; the remaining ones with inconspicuous buffy spotting, in contradistinction to *acadicus* in which the whitish spots are larger and more confluent proximally, and are present at least to some extent on all the primaries; upper wing coverts completely without spotting; alula with white border narrower; whitish spotting of tail more restricted than average of *acadicus.* The type is larger than males of *acadicus,* agreeing in size with the females. However, some mistakes in sexing occur in other species in this collection.

Differs from *Aegolius acadicus tacanensis* Moore in having wings and tail spotted.

Differs from *Aegolius acadicus rostratus* (Griscom) in having wings and tail spotted and in having a smaller culmen.

Differs from *Aegolius acadicus ridgwayi* (Alfaro) in having wing and tail spotted; face white; toes feathered except part of most distal phalanx.

Although the present specimen is in immature plumage, I do not wish to leave the impression that this species may not have a mature plumage in Oaxaca. The only published Oaxacan record is a male listed by Sclater (1858) from Cinco Senores. I have not been able to find this specimen, and it may well be in adult plumage. Macdonald (in litt., 1952)says it is not in the British Museum.

Range.—Known only from the type locality. Amatepec is located in the region of Mixe, which is in the same cordillera forming the Nudo

Celebes; Dollfus, 1917, Geologische en Geograpfische Doorkruisingen van Midden-Celebes, (Leiden), vol. 3, p. 993.

Not *Dentalium martini* Whitfield, 1882, Ann. New York Acad. Sci., vol. 2, p. 203; see also: *D. boussaci* new name, this paper.

Dentalium invalidum new name

Dentalium (*Dentalium*) *laqueatum regulare* Henderson, 1920, U. S. Nat. Mus. Bull. 111, p. 26, pl. 1, fig. 8, Recent, Jamaica, Antigua and Barbados islands.

Not *Dentalium regulare* Ahlburg, 1906, K. Preussische Geol. Landesanstalt und Bergakademie, Berlin, Abhand., ser. 2, vol. 50, p. 86, pl. 3, fig. 2 a-b.

Dentalium readi new name

Dentalium simile Read, 1907, [Read in Broili], Palaeontographica (Stuttgart), vol. 54, p. 71, pl. 6, fig. 4, "Pachycardientuffe" [Triassic], Southern Tyrol Mountains.

Not *Dentalium simile* Wissman, 1841, [Wissman in Münster], Beiträge zur Petrefaktenkunde, pt. 4, (Beiträge zur Geol. und Petrefak. . . . Tirols, . . .), p. 91, pl. 9, fig. 8.

Not *Dentalium simile* Giunti, 1859, Atti Accad. Gioenia Sci. Nat. in Catania, ser 2, vol. 14, p. 120, fig. 6 = ? *D. dentalis* Linné, 1766, Syst. Nat., 12 ed., p. 1263 *fide* Pilsbry and Sharp (1897:53).

Dentalium richardsoni new name

Dentalium subquadratum Richardson, 1906, Quat. Journ. Geol. Soc. (London), vol. 62, p. 588, pl. 45, fig. 8, "Lias," British Isles.

Not *Dentalium subquadratum* Meek, 1860, Proc. Acad. Nat. Sci., Phila., vol. 12, p. 311.

Dentalium sangiorgii new name

Antale dentale alternans Sangiorgi, 1926, Giornale Geol. Bologna, ser. 2, vol. 1, p. 119, pl. 7 (1), fig. 31, "Tertiary" Italy = *Dentalium* (*Antalis*) *dentale alternans* (*Sangiorgi*).

Not *Dentalium alternans* Chenu, 1842, Illustr. Conch., vol. 1, p. 1, pl. 4, fig. 17.

Not *Dentalium alternans* Müller, 1849, Programm Koen. Gymnasiums Aachen, p. 5, pl. 3, fig. 1 = *D. muellerianum* Pilsbry and Sharp, 1898, Man. of Conch., ser. 1, vol. 17, p. 224 [new name].

Not *Dentalium alternans* Ryckholt, 1852, Mém. Couronnes et Mém. Savants Etrangers, Acad. Roy. Sci. Belgique, vol. 24, p. 71, pl. 2, figs. 45, 46, for 1850-51 = *D. confusum* Sharp and Pilsbry, 1898, Man. of Conch., ser. 1, vol. 17, p. 220 [new name].

Dentalium waihoraensis[2] new name

Dentalium (*Laevidentalium*) *filum* Marwick, 1931, New Zealand Geol. Surv. Palaeont. Bull. no. 13, p. 158, figs. 342, 343, "Oligocene" New Zealand.

Not *Dentalium filum* Sowerby, 1860, Thes. Conch., vol. 3, p. 89, pl. 225, fig. 45.

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[2]Named for type locality, Waihora River, at the suggestion of Dr. Marwick, (*in literis*, 1953).

Dentalium subgracile new name

Dentalium gracile Grönwall and Harder, 1907, Danmarks geolog. undersögelse Kjöbenhavn, ser. 2, no. 18, p. 36, pl. 1, fig. 19, "Paleocene" Jutland.

Not *Dentalium gracilis* Hall and Meek, 1854, Mem. Amer. Acad. Arts and Sci., vol. 5, (n. ser.), p. 393, pl. 3, fig. 11 a-c.

Not *Dentalium gracile* Jeffreys, 1870, Ann. Mag. Nat. Hist., ser. 4, vol. 6, p. 74 = *D. filum Sowerby*, 1860, Thes. Conch., vol. 3 p. 89, pl. 225, fig. 45 *fide* Pilsbry and Sharp (1898:119).

Not *Dentalium gracile* Philippi, 1887, Tertiär. und Quatär. Verstein. Chiles, p. 107, pl. 12, fig. 15 = *D. navidadense* Pilsbry and Sharp, 1898, Man. of Conch., ser. 1, vol. 17, p. 210 [new name].

Dentalium subparvulum new name

Dentalium parvulum Richardson, 1906, Quat. Journ. Geol. Soc. (London), vol. 62, p. 585, pl. 45, figs. 9, 12, "Lias," British Isles.

Not *Fustiaria parvula* Stoliczka, 1886, Mem. Geol. Surv. India, Palaeontologica Indica, ser. 5, vol. 2, p. 445, pl. 27, fig. 22; *Dentalium parvulum* Stoliczka, Pilsbry and Sharp, 1898, Man. of Conch., ser. 1, vol. 17, p. 226.

Not *Dentalium parvulum* Philippi, 1887, Tertiär. und Quat. Verstein. Chiles, p. 107, pl. 12, fig. 16 = *D. philippianum* Pilsbry and Sharp, 1898, p. 212 [new name].

Dentalium subquadrangulare new name

Dentalium quadrangulare Deshayes, 1833, [in Bory St. Vincent], Expédition Scientifique en Morée, Mollusque, p. 132, pl. 26, fig. 14, Fossil, "Terrains Secondaires," Morea [Peloponnesus], Greece.

Not *Dentalium quadrangulare* Broderip and Sowerby, 1832, Proc. Zool. Soc. London, p. 29.

Dentalium suteri new name

Dentalium (*Episiphon*) *arenarium* Suter, 1907, Proc. Malac. Soc. (London), vol. 7, p. 214, pl. 18, fig. 11, Recent, Steward Island, New Zealand.

Not *Dentalium arenarium* Römer, 1855, Geol. Kennt, n.-w. Hartzebirges. Palaeontographica, vol. 5, p. 13, pl. 3, fig. 16.

PART II

The following is a list of new names proposed for preoccupied specific names compiled from the Zoological Record for the period 1899-1950.

Dentalium batheri Finlay, 1927

Trans. Proc. New Zealand Inst., vol. 57, p. 521 = new name for *D. huttoni* Bather, 1905, Geol. Mag. (London), ser 5, vol. 2, p. 532, not *D. huttoni* Kirk, 1880, Ann. Mag. Nat. Hist., ser. 5, vol. 6, p. 15; Kirk, 1880, Trans. Proc. New Zealand Inst., vol. 12, p 306.

Dentalium conradi Dall, 1909

U. S. Geol. Surv. Prof. Ppr. 59, p. 136 = new name for *D. substriatum* (Conrad), 1849 (in part), Geol. U. S. Expl. Expd., p. 728, pl. 20, fig. 7a only, not *D. substriatum* Deshayes, 1825, Mém. Soc. Nat. Hist. Paris, vol. 2, p. 366, pl. 18, figs. 1, 2.

Dentalium demersum Pilsbry, 1927

Nautilus, vol. 40, no. 4, p. 127 = new name for *D. inornatum* Wade, 1926, U. S. Geol. Surv. Prof. Ppr., no. 137, p. 100, pl. 33, figs. 2, 3, not *D. inornatum* M'Coy, 1844, Synops. Carb. Foss. Ireland, p. 47, pl. 5, fig. 30.

Dentalium (*Antalis*) pilsbryi Rehder, 1942

Nautilus, vol. 56, no. 2, p. 69 = new name for *D.* (*A.*) *pseudohexagonum* "Ihering" Henderson, 1920, U. S. Nat. Mus. Bull. 111, p. 46, pl. 6, figs. 1-3, not *D. pseudohexagonum* "Dall" Arnold, 1903, Mem. Calif. Acad. Sci., vol. 3, p. 186, pl. 8, fig. 12.

Dentalium semarangense Altena, 1938

Natuurk. Tijdscher. Ned.-Ind., vol. 98, no. 4, p. 211 = new name for *D. subrectum* K. Martin, 1884, Samml. Geol. Reichsmus. (Leiden), ser. 1, vol. 3, p. 185, not *D. subrectum* Jeffreys, 1882, Proc. Zool. Soc. (London), p. 661.

Dentalium (*Fissidentalium*) *meridionale verrilli* Henderson, 1920

U. S. Nat. Mus. Bull. 111, p. 62, pl. 9, fig. 3 = new name for *D. solidum* Verrill, 1884, Trans. Conn. Acad. Arts Sci, vol. 6, p. 215, pl. 44, fig. 16, not *D. solidum* Hutton, 1873, Cat. Tert. Moll. New Zealand, p. 2.

Dentalium vinassai Cossmann, 1912

Revue Critique Paléozoologie . . ., vol. 16, no. 3, p. 215 = new name for *D. anceps* "Menegh." Vinassa de Regny, 1897, Soc. Toscana Sci. Nat., Pisa, Proc. Verb., vol. 10, p. 260, not *D. anceps* Sowerby, 1837, Trans. Geol. Soc. London, ser. 2, vol. 5, p. 136, pl 8, fig. 19.

Dentalium wadei Pilsbry, 1927

Nautilus, vol. 40, no. 4, p. 142 = new name for *D. intercalatum* Wade, 1926, U. S. Geol. Surv. Prof. Ppr. 137, p. 100, pl. 33, figs, 18, 19, not *D. intercalatum* Gould, 1859, Proc. Bost. Soc. Nat. Hist., vol. 7, p. 166.

Siphonodentalium (*Dischides*) *subpolitum* Cossman and Peyrot, 1916

Soc. Linn. Bordeaux, Actes, vol. 69, p. 185, pl. 2, figs. 8-10 = new name for *Gadus politus* Benoist, 1873, Soc. Linn. Bordeaux, Actes, vol. 29, p. 269, no. 228, not *Cadulus politus* (Wood), 1842, Ann. Mag. Nat. Hist. (London), vol. 9, p. 459, pl. 5, fig. 14.

Gadila benoisti Cossmann and Peyrot, 1916

Soc. Linn. Bordeaux, Actes, vol. 69, p. 182, pl. 2, figs. 1-3 =new name for *Gadus ventricosus* Benoist, 1873, Soc. Linn. Bordeaux, Actes, vol. 29, p. 268, no. 228 [=*Cadulus*], not *Cadulus ventricosus* (Bronn), 1827, Verz. im Heidelb. Compt. befindl. Conchylein. Jahrb., vol. 2, p. 539.

Cadulus brazieri Finlay, 1927

Trans. Proc. New Zealand Inst., vol. 57, p. 521 = new name for *Dentalium laeve* Brazier, 1877, Proc. Soc. New So. Wales, vol. 2, p. 59 [=*Cadulus*], not *D. laeve* Turton, 1819, Conch. Dict., p. 256, nor *Dentalites laeve* Schlotheim, 1820, Die Petrefackten, p. 93 [=*Dentalium*] the validity of this species is uncertain, nor *Dentalium laevis* Hutton, 1873, Cat. Tert. Moll. New Zealand, p. 2 = *D. pareorensis* Sharp and Pilsbry, 1898 [new name].

Cadulus martini Finlay, 1927

Trans. Proc. New Zealand Inst., vol. 57, p. 521 = new name for *Dentalium compressum* K. Martin, 1886, Samml. Geol. Reichsmus. (Leiden), ser. 1, vol. 2 p. 189 [=*Cadulus*], not *D. compressum* d'Orbigny, 1850, Prodr. Paléont. Strat., vol. 1, p. 223, nor *D. compressum* Watson, 1879, Journ. Linn. Soc. London, vol. 14, p. 516 = *D. pressum* Sharp and Pilsbry, 1898, Man. of Conch., ser. 1, vol. 17, p. 124 [new name], nor *D. compressum* Sowerby, 1888, Proc. Zool. Soc. London, p. 569 = *D. hungerfordi* Pilsbry and Sharp, 1897, Man. of Conch., ser. 1, vol. 17, p. 84 [new name].

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Pilsbry, H. A., and Sharp, B., 1897-1898, *In* G. W. Tryon, Manual of Conchology, Scaphopoda, ser. 1, vol. 17, xxxi-280 pp., 40 pls., [pp. i-144 = 1897; pp. 145-280 = 1898], Philadelphia.

Zoological Record, 1864 —, Zoological Society of London, [Mollusks, Sect. 9, A. E. Salisbury, Editor].

whitish with dusky terminal bars; lower throat and breast near Avellaneous, with dusky brown terminal margins, giving a scaled appearance; malar apex buffy, posterior part more whitish, with dusky tips on both parts; sides of breast Hair Brown with obsolete shaft streaks; belly Tilleul Buff; flanks Vinaceous Buff × Light Drab; under tail-coverts pale brown with soiled whitish terminal margins. Remiges largely blackish; a basal area of rufous color, dull on inner web of 4th primary (from outside), and deeper on both webs of remaining inner primaries, continued on both webs of secondaries where, however, the rufous area is exteriorly margined rather broadly with blackish, making a blackish patch on the closed wing; tertials browner with lighter outer margins and tips; primary-coverts dusky with dull, warm brown outer margins; rest of upper wing-coverts with dark brown centers and lighter margins not sharply defined. Median rectrices lacking in this specimen; submedian pair Fuscous on inner web, Fuscous × Fuscous Black on outer one; third pair Fuscous Black; 4th and 5th pairs similar but with a deep Wood Brown terminal bar, broader on 5th pair; outermost pair similar but with still broader, though duller, tip on inner web and with that on outer web continued basad for some 25 mm. and then to near the base as a fine outer margin. Bill (in dried skin) dull black; feet brownish black. Wing, 108 mm.; tail 85; exposed culmen, 35; culmen from base, 39; tarsus, 26.5.

Remarks: The other specimen from southeastern Perú is a little lighter colored above than the type, but not so light as in *hypoleuca,* and the lateral under parts are also a little lighter. The rufous color of the basal part of the inner primaries and the secondaries is somewhat more extensive than in the type but not sharply defined as in *saturatior,* while the blackish exterior margin of part of the rufous patch, so prominent in the type, is obsolete. The bill is shorter than in the type (culmen from base, 37 mm.) but longer than in any certain *saturatior* at hand, and is similarly more weakly curved than in *saturatior.* This specimen was labeled by the collector as immature and although the plumage appears to be of adult texture, the bill has a somewhat immature appearance and may be shorter than it would have been when fully developed.

Since the type lacks the median rectrices, it may be well to state that these feathers in the second specimen are a little darker than the back and darker than in nearly every example of *saturatior* at hand, in spite of the fact that these have darker backs than the Peruvian example. Since the type has the remaining rectrices even deeper blackish than the paratype, it may be suspected that the median rectrices were darker in similar degree.

One uncertain specimen is confusingly labeled "Falls of the Madeira" with this deleted and replaced by "Valparaiso." There is no certainty that it came from the latter place although "Falls of the Madeira" is, of course, impossible. The specimen was collected by H. H. Rusby whose careless labeling I have had earlier occasion to criticize. It is not impossible that the bird came from Lake Titicaca, but Valparaiso seems more probable. The bill is 36 mm. in length—almost as long as in the (immature) Peruvian specimen and has much the same curvature; the rufescence of the inner remiges is sharply defined as in *satu-*

ratior; the general coloration is neither that of the Peruvian birds nor that of *saturatior.* Another Rusby specimen, labeled "near Valparaiso," is very similar, although the bill is a little shorter (33 mm.). Two other Chilean specimens, without exact locality or date, agree closely with the two Rusby skins and have the bills 33 and 35 mm. respectively, one at the maximum for *saturatior* in the series at hand, and the other longer. All four specimens are warmer brown above than *saturatior* or *peruana* although darker than *hypoleuca;* the upper wing-coverts are relatively uniform, without paler margins, and the rufous coloration at the base of the remiges is, as noted, sharply defined as in *saturatior.* Without reliable data for any of the four specimens, their exact assignment is difficult, but they appear to be nearest to *saturatior.*

There is some variation in the series of *hypoleuca* at hand that is not clear. Specimens from the more southern parts of the range in Argentina (Tucumán, Córdoba, and Mendoza) are duller and darker above, and have the margins of the gular and pectoral feathering stronger and more dusky than birds from Jujuy and Salta, although some of the Tucumán specimens are intermediate. It does not appear to be a seasonal distinction but its full significance remains to be determined. Bond and De Schauensee (Proc. Acad. Nat. Sci. Phila., 94: 329, 1941) found January and February birds in Bolivia to be more heavily squamulated on the under parts than June and July examples, a pattern of variation that does not apply to the Argentine series now before me. For the present, however, I refer all these specimens to *hypoleuca.*

Hellmayr (Field Mus. Nat. Hist., zool. ser., 19: 166, 1932) called attention to a specimen in the Berlin Museum from Santiago, Chile, that was like *saturatior* in coloration but had the bill of *hypoleuca,* the form commonly found in the mountains near Santiago. The description suggests *peruana,* but assignment to that form would be problematical without actual comparison. If it should prove to belong to *peruana,* the status of that form would be reduced to that of a migrant both in Perú and in the neighborhood of Santiago, Chile; its breeding range would need to be determined but would, of necessity, be farther to the southward where conflict with *U. d. dumetaria* would be a factor. The similarity of the two Peruvian specimens from points as close as their respective localities and the fact that they are the only examples known from Perú, taken twelve years apart, one in May and the other in June, suggests a closer relationship of subspecies and locality than might be expected in a winter visitant.

There is a sight record of *"Upucerthia dumetoria"* from the seacoast at Mollendo (Pässler, 1922, Jour. f. Orn., 70: 457-458, 1922) that is certainly in error. The species was said to be common from the coast to the mountains and from southern Chile to northern Perú, and its behavior in picking up small crabs, worms, and the like from the beach and wharves was described, but neither statement is acceptable for this Temperate Zone species, at least as far as Perú is concerned. Hellmayr (Field Mus. Nat. Hist., zool. ser., 19: 166, 1932) accepts Pässler's account as far as it concerns the Chilean records, assigning it to *U. d. saturatior,* but since the bird is reported as living and even nesting along the coast, a statement at variance with other

accounts, even in Chile, it is equally doubtful that Pässler correctly identified the Chilean birds he saw.

The ranges of the various forms still need an exhaustive study since there are many disagreements in the areas cited by different workers. Some of the confusion no doubt is due to the fact that most, if not all, of the subspecies are migratory and occur together in their winter ranges, but even this will not explain all of the troublesome factors. Thus *U. d. dumetaria* appears to have been found breeding as far north as the Province of Buenos Aires, Argentina, but two specimens at hand from "Tova I. Lat. 45°" [=off the coast of Chubut] are certainly *hypoleuca*. They were taken in August and may be migrants, but if so they were found far south of their breeding range in Mendoza and northward.

At any rate, additional information on *peruana* and its distribution, either as a migrant or resident in Perú, will be awaited with much interest.

Specimens Examined

U. d. peruana.—

PERÚ:

East of Juliaca, 1 ♂ (type)[1];
Chucuito, 1 ♂[2]

U. d. hallinani.—

ARGENTINA:

Tucumán, 1 ♂[3], 1 ♀[3];
Angaco Sud, 1 ♂[3].

CHILE:

Tofo, 1 ♂ (type).

U. d. hypoleuca.—

ARGENTINA:

Jujuy (Tilcara), 2 ♂, 1 ♀;
Salta (Cachí), 2 ♂, 1 (?);
San Juan (Media Agua and Angaco Sud), 4 ♂, 2 ♀;
Tucumán (Río Sali and Tafí del Valle), 4 ♂, 6 ♀;
Córdoba (Cosquín), 1 ♂;
Mendoza (Mendoza and Puente del Inca), 4 ♂, 6 ♀, 2 (?);
Chubut (Tova Island), 1 ♀, 1 (?).

CHILE:

Aconcagua (Valle de los Pinguines), 1 ♂;
Santiago, 1 ♂, 1 (?).

U. d. saturatior.—

CHILE:

Temuco (Maquehué), 1 ♀;
O'Higgins (San Bernardo and San Francisco), 1 ♂, 1 ♀;
Valparaiso (Quillota and Prov. de Valparaiso), 1 ♂, 1 ♀;
Santiago (Alrededores de Santiago), 1 ♂;

[1]Specimen in Museum of Vertebrate Zoology, Berkeley, California.
[2]Specimen in U. S. National Museum, Washington, D. C.
[3]Presumably migrants.

Colchagua (Prov. de Colchagua), 1 ♂;
"Chili," 1 ♀.

U. d. (near) *saturatior.*—

CHILE:

"Valparaiso," 1 (?);
"near Valparaiso," 1 (?);
"Chili," 2 ♂.

U. d. dumetaria.—

ARGENTINA:

Santa Cruz (Rio Gallegos), 3 ♂.

CHILE:

Punta Arenas, 1 ♀.

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PROCEEDINGS
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BRASILIAN THYSANOPTERA. V.

By J. Douglas Hood

The generic name *Myopothrips,* proposed in the preceding paper of this series (Proc. Biol. Soc. Wash., 67:49, 1954), is pre-occupied (Priesner, Philip. Journ. Sci., 71(4) :405, 1940). I overlooked this latter paper because I did not receive a reprint of it, Dr. Priesner's whole consignment having been destroyed on its way to him during the last war. I am particularly happy to rename the genus as

Priesnerothrips, nom. nov.,

in his honor: no one has labored more faithfully or more competently upon this group of insects.

Heterothrips angusticeps, sp. nov.

Readily known from the other members of the *sericatus* group (as well as from all other members of the genus) by the long, narrow head and the division of the third antennal segment into six parts.

♀ (macropterous).—Color dark blackish brown, not paler in basal abdominal segments, with red internal pigmentation in fresh specimens; femora concolorous with body, fore pair yellow at tip, middle and hind pairs yellow at base; tibiae and tarsi yellow, the former shaded slightly at middle of dorsal surface; fore wings dark at extreme base and in apical three-fourths, remainder clear white; antennae concolorous with body in segments I, II, and IV-IX, II yellowish apically, III yellowish white in first five subdivisions (the last three of these distinguishably shaded with gray), its remainder gray-brown but much paler than IV and yellowish basally. Length about 1.1 mm. (distended, 1.4). Head 107, width across eyes only 111, across cheeks behind eyes 108, greatest width across cheeks 111, across base 106, the cheeks thus nearly straight and subparallel; surface delicately cross-striate, with about 8 stronger dark striae in occipital area; no setae directly in front of median ocellus; eyes 70, width 37, interval 38; mouth-cone with tip about 37 behind dorsal margin of head; antennae normal, save for the six-partite third segment; I 20(26), II 36(24), III 63(23), IV 37(24), V 27(19), VI 24(16), VII 14(11), VIII 11(9), IX 13(5). Pronotum 130, width 167; surface lightly cross-striate with pale lines about 5μ apart (a few along posterior margin darker and heavier) and with few setae; mesonotum closely sculptured with somewhat roughened dark lines which are less than 2μ apart; anterior metanotal plate concentrically striate, the striae with closely set microtrichia; fore wings 658, setae brown in dark areas, costa with about 25, anterior vein with about 24, posterior vein with about 20. Abdomen 265 at segment IV, pubescent laterally in I-VII

and in most of VIII and IX, X with a median patch at middle of length; comb complete on VI-VIII, anterior segments often with a few median teeth; sterna II-VII similarly fringed, or with comb on VII interrupted on either side of median line; sterna not setose in front of posterior fringe.

♂ (macropterous).—Length about 1 mm. Color as in female; third antennal segment composed of six parts (as in ♀); abdominal terga I-VI without comb in median third or more, VII and VIII with comb complete, IX not modified; sterna VII and VIII with transverse glandular areas.

BRAZIL: Nova Teutonia, S. C., Nov. 17-18 (7 ♀♀ and 1 ♂, including holotype and allotype, respectively) and 20 (1♂), 1949, Fritz Plaumann.

Heterothrips bicolor, sp. nov.

Like *ornatus* in having (1) posterior margins of abdominal terga fringed with microtrichia which arise from the terga themselves, rather than from margining scales or plates, the comb on VI complete, (2) pronotum not cross-striate with pale lines, (3) fore wings with white subbasal cross-band, (4) mid and hind tibiae yellow, (5) no setae in front of median ocellus, (6) mesonotum very closely striate, and (7) abdomen conspicuously bicolored, largely or wholly yellow in segments III-VIII; but without median blotch on terga III-VII, VIII shaded across posterior third, head slightly broader across eyes than across cheeks, the latter parallel anteriorly and curving to base in about posterior half, antennal segment III with pedicel 10μ long, V yellow at base and 30 x 17, VI 28 x 13.

♀ (macropterous).—Color blackish brown in head, thorax, and abdominal segments I, II, IX, and X, the intervening abdominal segments clear bright yellow, with posterior third of VIII brown, the thorax with bright red internal pigmentation; all femora blackish brown, with the fore pair broadly yellow at tip and the middle and hind pair yellow at base, all tibiae and tarsi bright yellow; fore wings dark at extreme base, then with a white band followed by a dark one, the latter fading at basal two-fifths into the pale yellowish remainder; antennae largely yellow in segments I-V, I lightly shaded with brown in basal half, III and IV gray-brown beyond setae (except for the pale sensorial spots), V gray-brown in about apical half, which is concolorous with VI-IX. Length about 1 mm. (distended, 1.2). Head 98, width across eyes 132, across cheeks 129, across base 117, surface delicately cross-striate, about 7 stronger dark striae in occipital area; no setae in front of median ocellus; eyes 63, width and interval each about 44; mouth-cone with tip about 57 behind dorsal margin of head; antennae normal; segment III composed of four parts; I 21(26), II 34(24), III 63(24), IV 44(23), V 30(17), VI 28(13), VII 15(9), VIII 12(7), IX 13(4). Pronotum 116, width 179, with two or three dark striae along posterior margin, remainder almost without sculpture and very sparsely setose; mesonotum with striae dark and very close (about 1.5μ apart); anterior metanotal plate concentrically striate, the striae closely granulate; fore wings 616, setae dark in dark areas, costa with about 24, anterior vein with about 29, posterior vein with about 22. Abdomen 251 at segment

IV, closely pubescent laterally in I-VIII, less closely in median portion of VIII, closely in most of IX and in a median patch on X; sterna without accessory setae.

BRAZIL: Nova Teutonia, S. C., Nov. 26, 1949, Fritz Plaumann, 1 ♀ (holotype).

Heterothrips decoratus, sp. nov.

Like *flavidus*, only, in pale coloration; but bright yellow, with head dark brown in ocellar area and vicinity, meso- and metanota and abdominal terga II-X each marked with a gray blotch or dash, fore wings white at base, legs wholly yellow, head slightly broader across eyes than across cheeks (about 0.83 as long as wide), and antennal segment III composed of four parts.

♀ (macropterous).—Color pale lemon yellow, deeper in pterothorax and last three abdominal segments; head dark brown between eyes and behind ocellar area, latter darkest; pronotum narrowly edged with gray along posterior margin; meso- and metanota each with a pale gray blotch; tergum II of abdomen with a broad gray dash occupying posterior half or more of median two-thirds, III-VIII each gray in most of median third, IX and X gray apically; legs concolorous with body; fore wings nearly colorless in basal fifth, gray beyond; antennae with segments I and II pale gray, II pale yellow apically and at middle, III and basal two-thirds of IV pale yellow, IV gray apically except in the band of sensoria, V-IX dark brownish gray, V yellowish in basal half beyond pedicel. Length about 1.3 mm. (distended, 1.4). Head 119, across eyes 143, across cheeks 139, across base 127, delicately cross-striate, about 8 stronger striae in occipital area; no setae in front of median ocellus; eyes 77, width about 47, interval about 49; mouth-cone with tip 68 beyond dorsal margin of head; antennae normal; segment III composed of four parts; I 23(27), II 40(25), III 73(23), IV 47(22), V 37(17), VI 36(15), VII 20(11), VIII 16(9), IX 17(6). Pronotum 136, width 185; surface cross-striate, the lines heavy and dark along posterior margin, pale and faint elsewhere; mesonotum with heavy, close, dark striae; anterior metanotal plate concentrically striate; fore wings 742, setae dark gray in dark area, costa with about 28, anterior vein with 4 + 22, posterior vein with 20. Abdomen 325 at segment IV, closely pubescent laterally in terga I-VII, in nearly all of VIII, in posterior half of IX, and at middle of X; posterior margins of terga I-VIII fringed with microtrichia which arise directly from the terga themselves, rather than from margining scales or plates, this comb absent from median portion of I-III, absent or vestigial on IV and V, complete on VI-VIII; sterna II-VI similarly fringed but without setae in advance of the prominent dark ones along posterior margin.

♂ (macropterous).—Length about 1 mm. Color pale yellow, slightly darkened in ocellar area, only; antennae pale yellow in segments I-IV and in about basal halves of V and VI, remainder gray-brown; fore wings white at base, yellowish beyond; tergum IX not modified; transverse glandular areas on sterna VII and VIII.

BRAZIL: Nova Teutonia, S. C., Feb. 4, 1949, Fritz Plaumann, 6 ♀♀ (including holotype) and 2 ♂♂ (including allotype), from *Luehea*.

Heterothrips flavidus, sp. nov.

Like *decoratus*, only, in pale coloration; but dull yellow, diffusely shaded with gray-brown, especially along sides of prothorax and toward tip of abdomen, fore wings not white basally, all femora and tibiae with a slight cloud at middle of dorsal surface, head much broader across cheeks than across eyes and about 0.7 as long as wide, and antennal segment III composed of three parts.

♀ (macropterous).—Color golden yellow, shaded with gray or brown along sides of pterothorax and in abdomen, the latter gradually darkened to yellowish gray-brown in last segments and along sides; legs about concolorous with body, all femora and tibiae with a cloud at middle of upper surface; fore wings uniform yellowish brown; antennae brownish white in segment I, gray-brown in II and IV-IX, III pale yellow in basal half, apical half gray-brown but paler than IV, darkened to tip. Length about 1 mm. (distended, 1.2). Head 104, across eyes 134, just behind eyes 133, greatest width across cheeks 136, at base 126; surface delicately cross-striate, about 8 stronger striae in occipital area; no setae in front of median ocellus; eyes 66, width about 44, interval about 47; mouth-cone with tip 44 beyond dorsal margin of head; antennae short, only twice as long as head, and stout; segment III composed of three parts; I 19(27), II 34(23), III 45(24), IV 33-34(24), V 23(19), VI 20(18), VII 13(11), VIII 10(8), IX 13(5). Pronotum 121, width 193, cross-striate with faint pale lines; mesonotum moderately closely striate with pale lines; anterior metanotal plate concentrically striate; fore wings 637, all setae dark gray, costa with about 26, anterior vein with about 4 + 17, posterior vein with 15. Abdomen 269 at segment IV, closely pubescent laterally in terga I-VII, in nearly all of VIII, in posterior two-thirds of IX, and at middle of X; posterior margins of terga I-VIII fringed with microtrichia which arise directly from the terga themselves, rather than from margining scales or plates, this comb absent from median portion of I-IV, broken on V, complete on VI-VIII; sterna II-VI similarly fringed but without setae in advance of the series along posterior margin.

BRAZIL: Nova Teutonia, S. C., Nov. 26, 1949, Fritz Plaumann, 2 ♀♀ (including holotype) from an unidentified plant.

Heterothrips marginatus, sp. nov.

Unique in having the posterior margins of abdominal terga II-VIII and sterna II-VI fringed with a continuous flange (much as the *Chirothripinae*), rather than with a continuous series of separate plates, from whose posterior margin arises a comb-like series of microtrichia.

♀ (macropterous).—Color brown, distinctly blackish in head, thorax, and last two abdominal segments, head darkest; legs golden yellow, more deeply so, or even shaded, at middle of all femora and tibiae; fore wings brown, without subbasal white band, the setae pale and very inconspicuous; antennae nearly concolorous with head in segments I, II, and VII-IX, III-VI largely or partly golden yellow, III and IV (in fresh specimens) with orange pigmentation across tip, III-V successively more heavily and extensively shaded apically, III often only slightly so, V sometimes dark in all of apical half, VI often largely yellow, sometimes yellow only subbasally. Length about 1.2 mm. (dis-

tended, 1.3). Head 100, across eyes 129, across cheeks 130, across base 127, surface delicately cross-striate, about 7-8 stronger dark striae in occiptal area; a pair of setae directly in front of median ocellus; eyes 73-81, about 43 wide and 46 apart; mouth-cone with tip about 69 behind dorsal margin of head; antennae normal; segment III composed of three parts; I 23(27), II 35(25-26), III 53(23), IV 36(23), V 33(19), VI 34(16), VII 21(10-11), VIII 19(10), IX 18(6). Pronotum 121, width 189; surface subreticulate with pale lines; mesonotum with striae pale, indistinct, anastomosing frequently, and about 5μ apart; anterior metanotal plate concentrically striate, the striae closely set with microtrichia; fore wings 608, setae pale and inconspicuous, costa with about 8 (eight!), anterior vein with about 20, posterior vein with about 13. Abdomen 297 at segment IV, sparsely pubescent laterally in terga I-VII and in about posterior half of VIII, more distinctly so in about posterior two-thirds of IX, dorsum of X bare; sterna without accessory setae.

♂ (macropterous).—Length about 0.9 mm. Color and structure much as in female; terga and sterna II-VIII fringed as in female; sterna III-VIII with small elliptical glandular areas, that on III 8μ long, 24μ wide, others larger, that on VIII about II x 40μ.

BRAZIL: Belém, Pará, July 24, 1951, J. D. H., 9 ♀♀ (including holotype) and 1 ♂ (allotype), from *Andropogon*.—Campo Grande, D. F., June 28, 1948, J. D. H., A. da Costa Lima, and Aristóteles G. d'Araujo e Silva, 1 ♀, from dead branches.

Charassothrips, gen nov.

(Χᾶράσσω, engrave; θρίψ)

Head lightly reticulate dorsally, with rounded cheeks, moderately protruding eyes, and deeply-grooved frontal costa; ocellar area slightly elevated, median ocellus directed forward; front of head concave in its upper part between eyes, and slightly produced and everhanging at a lower level (above frontal costa and bases of antennae); dorsal surface with a pair of minute setae flanking median ocellus; another similar and more anterior pair close to eyes, a pair close to inner anterior margins of posterior ocelli, two pairs on a transverse line tangent to posterior margins of eyes, and two more on cheeks close behind eyes; mouth-cone short and rounded, maxillary palpi 3-segmented; antennae 8-segmented, formed much as in *Sericothrips*, with forked sense-cones on segments III and IV. Thorax lightly reticulate dorsally; pronotum with straight anterior margin, other margins rounded, without long setae. Legs normal. Fore wings pointed, somewhat broadened at base, slender beyond, all setae minute, fore vein setose in basal two-fifths and with about two setae near tip, hind vein setose throughout. Abdomen with posterior margins of terga II-VII produced into a lobulate fringe, VIII with complete comb, sterna not flanged, lateral thirds or more of terga II-VIII cross-striate, the striae closely set with microtrichia; IX without microtrichia, X pilose in apical half; setae on IX and X not long.

Type species: *Charassothrips urospathae*, sp. nov.

An unusual genus, assignable to the Sericothripinae.

Charassothrips urospathae, sp. nov.

♀ (macropterous).—Color brown or blackish brown, with red internal pigmentation; bases of femora, and the tibiae and tarsi, yellow, fore femora paler than mid and hind pairs and yellow at tip, tibiae shaded at middle; fore wings nearly colorless in basal fourth, dark gray beyond and at extreme base; antennae concolorous with head in segments I, II, and VI-VIII, III and IV yellow, very lightly shaded with brown, IV darker, III nearly colorless just beyond pedicel, V brown but paler than VI, with a nearly colorless ring beyond the dark pedicel. Length about 0.9 mm. (distended, 1.1). Head 100, across eyes 121, just behind eyes 106, across cheeks (exclusive of sculpture) 115, across base 109, across frontal costa 8, surface finely reticulate with dark lines, the reticles with minute granulations and wrinkles and with anterior margins arcuate; cheeks rounded to eyes and to base, finely but deeply serrate; eyes 57, 39 wide, and 44 apart; mouth-cone with tip about 75 behind dorsal margin of head; segment I of antennae 16(24), II 30(23), III 40(17), IV 40(15), V 30(15), VI 42(15), VII 10(6), VIII 15(3-4). Pronotum 103, width 153, sculptured much like head, without long setae; mesothorax 166 across anterior angles, 197 at widest point, metathorax 203 posteriorly; meso- and metanota sculptured much like head and pronotum but with reticles smaller; fore wings 547, with about 31 small pale setae on costal margin, fore vein with 8-10 (often in two groups) in basal two-fifths and two near tip, hind vein with about 13. Abdomen about 224 at segment IV; IX with seta I 42, II 47, III 50, X with seta I 33, II 56.

♂ (macropterous).—Length about 0.7 mm. (distended, 0.8). Color and structure essentially as in female.

BRAZIL: Belém, Pará, August 11, 1951, August M. Gorenz, George A. Black, and J. D. H., 11 ♀♀ (including holotype) and 2 ♂♂ (including allotype), from flowers of *Urospatha caudata.*

Sericothrips fimbriatus, sp. nov.

Readily known from *basilaris* (the only other Neotropical species with segment VII of abdomen dark in color, terga II-VI fringed medially along posterior margin, and only one white cross-band on fore wings) by the nearly white abdominal segments I, V, and VI, the nearly white tips of the fore wings, the delicate pale lines of reticulation in front of pronotal blotch, the origin of the interocellar setae posterior to median ocellus, and the stronger and more widely spaced mesonotal striae (about 1.5μ apart).

♀ (macropterous).—Color dark brown and yellow (or yellowish white), the head yellowish behind occipital line, its remainder and mesothorax and abdominal segments VII-IX dark brown both dorsally and ventrally, metascutellum dark brown, terga II-IV of abdomen dark brown in lateral thirds, metasternum shading from brown at sides to yellow medially, remainder of body pale yellow or white, except for lateral shading on tergum X of abdomen and the light brown pronotal blotch; legs with coxae largely brown, hind femora brown in apical half (excepting their pale tips), remainder of legs nearly clear yellow; fore wings dark brown in most of basal sixth, clear in second sixth and at tip, intervening portion shading from dark brown basally to light

brown apically; antennae pale yellowish in segments I, II, and basal half of III, this last shaded with brown beyond, IV darker than III, with pedicel brown and apical half shaded, V-VIII dark brown, V narrowly pale just beyond pedicel. Length about 0.9 mm. (distended, 1.2). Head 100, across eyes 167, across cheeks 149, at base 137, across frontal costa 20; sculpture normal, occiput finely and closely cross-striate with pale lines; occipital apodeme dark and tangent with eyes and elevated ocellar area; eyes 64, about 46 wide and 75 apart; mouth-cone short (tip 68 from dorsal margin of head), broadly rounded. Antennal segments: I 20(27), II 39(27), III 66(24), IV 43(23), V 46(18), VI 52(16), VII 11(7), VIII 14(5); sense-cones and chaetotaxy normal. Prothorax 110, across pronotum 196, subreticulate in front of blotch, the latter with anterior apodeme strong and arcuate; seta at posterior angles 40, dark brown, nearly straight, other setae pale; mesonotum and anterior metanotal plate very finely striate with dark lines, but without wrinkles or interlineations; hind tibiae 203; fore wings 686, setae brown, darker in dark areas, vein with about 3 + 24, no accessory setae. Abdomen 281 at segment IV, antecostal lines on terga II-IV and VII nearly black, those on V and VI strong but pale, VIII and IX with a dark line along anterior margin; terga II-VI without medial posterior fringe.

BRAZIL: Nova Teutonia, S. C., Jan. 10 (1 ♀ from leaves of *Vitis*) and Nov. 17-18 (1 ♀), 1949; Feb., 1950 (2 ♀♀, including holotype); and May, 1952 (1 ♀); all collected by Fritz Plaumann.

Sericothrips daedalus, sp. nov.

Very different from all other Neotropical species which have banded fore wings, abdominal terga II-VI without medial posterior fringe, and occipital apodeme not confluent with posterior margins of eyes in that the pronotum is lightly reticulate in front of pronotal blotch.

♀ (macropterous).—Color dark brown and white, the head yellowish brown, shading behind the darker ocellar area and darker occipital apodeme to nearly white at base; pronotal blotch distinct, brownish yellow; mesothorax and abdominal segments VII and VIII blackish brown dorsally, paler ventrally, IX and X dark laterally, II-IV brown in lateral thirds, both dorsally and ventrally; metascutellum dark brown; legs with coxae largely brown, their remainders largely yellow, fore femora shaded with brown at middle of upper surface, mid and hind femora brown in about apical half (except for their pale tips); tibiae paler at either end, very lightly shaded with brownish yellow between; tarsi yellow; fore wings dark in most of basal seventh, then white for a somewhat greater distance, then dark to middle, then with a white band equal in width to a following dark one, tip of wing white; antennae with segments I and II pale brownish yellow, II somewhat paler at middle apically; III grayish yellow, paler than I and II, very slightly darkened at extreme tip; IV like III in basal half, slightly paler just beyond pedicel, shading to brown beyond setae; V-VIII largely gray-brown, V yellow just beyond pedicel, thence shading to gray-brown in somewhat more than apical half. Length about 1.1 mm. (distended, 1.3). Head 126, across eyes 174, across cheeks 168, at base 154, across frontal costa 27, this last thus broader than usual and nearly flat in

the groove; sculpture normal, occiput finely and closely cross-striate with pale lines; occipital apodeme dark brown, arched forward, separated from eyes by less than diameter of a facet, but about tangent with ocellar area; eyes 75, width about 45, interval about 84; mouth-cone short, dark, rounded at tip, extending about 75 beyond dorsal margin of head. Antennal segments: I 20(27), II 40(28), III 54(22), IV 54(20), V 43(19), VI 50(17), VII 11(7), VIII 15(6): sense-cones and chaetotaxy normal. Prothorax 137, across pronotum 218, closely striate within blotch, delicately reticulate anteriorly, strongly transversely reticulate with dark lines behind blotch, the blotch itself clearly outlined by slightly darker apodemes, its front and hind margins deeply concave; seta at posterior angles 47, dark brown, outstanding, other setae pale; mesonotum and anterior metanotal plate very finely and closely striate with dark lines, without inter-strial granules or lines; hind tibiae 224; fore wings 784, setae dark brown in dark areas, vein with about 3 + 21, usually two accessory setae in distal dark band. Abdomen 295 at segment IV, antecostal lines on II-VII complete and nearly black, VIII-X with a dark line along anterior margin.

♂ (macropterous).—Length about 0.9 mm. (distended, 1.0). Like ♀ in color and structure, except that the first dark apical segment of abdomen is VIII.

BRAZIL: Nova Teutonia, S. C., Feb. 4, 1949, Fritz Plaumann, 3 ♀♀ (including holotype) and 3 ♂♂ (including allotype), from *Leuhea.*

Sericothrips ruginosus, sp. nov.

Like *portoricensis* in having abdominal segments VII-IX dark blackish brown, fore wings dark at tip and with two pale cross-bands, pronotum wrinkled between dark transverse striae, and median notch in anterior margin of darkened portion of metasternum obtuse; but with abdominal segment IX yellow, dark band at middle of fore wings terminating at apical 0.4 of wing, median portion of posterior margin of abdominal terga II-VI without a narrow ragged comb, antecostal line on VI rarely darkened in lateral thirds, median setae on II-VII usually with trichopores tangent with antecostal line, and eyes about two-thirds as wide as their interval.

♀ (macropterous).—Color blackish brown and yellow (or white), darkest in abdominal segments VII-IX, the head brown, blackish along cheeks, paler in front, fading to pale brownish yellow medially behind occipital line; pronotal blotch darkened, bounded in front and behind by dark apodemes, the anterior one heavier; pterothorax dark dorsally and ventrally save for posterior metanotal plate; terga II-V of abdomen light brown, usually successively paler, VI yellow or white, VII-IX dark blackish brown, X abruptly pale yellow; antecostal lines on II-VII nearly black (sometimes paler in lateral thirds on VII); VIII-X with dark anterior margining line; coxae brown, darker laterally; hind femora shaded with brown in distal half (excepting tip), remainder of legs yellow, with fore and middle femora and tibiae more or less clouded at middle, hind tibiae yellow; fore wings darkened in about basal ninth, clear beyond for one-seventh their length, then with a dark band which fades out at apical 0.4, followed by a white band (which is slightly wider than the dark band) extending from it to tip; antennae with

segments I-V cream-colored, III more or less shaded apically, IV dark brownish beyond setae, V darkened in about apical half and in pedicel, VI-VIII gray-brown. Length about 1.0 mm. (distended, 1.1). Head 98, across eyes 153, across cheeks 143, across base 127, across frontal costa 12, frontal groove (in dorsal aspect) U-shaped, with slightly diverging sides; sculpture normal, occiput finely and closely cross-striate with dark lines; occipital apodeme dark, arched, tangent with posterior margins of eyes and ocellar area; eyes 66, width about 44, interval about 66; mouth-cone 71, somewhat darkened, rounded at tip. Antennal segments: I 21(26), II 37(27-28), III 50(23), IV 56(20), V 46(17), VI 47(15), VII 12(6), VIII 13(4); sense-cones and chaetotaxy normal. Prothorax 118, across pronotum 182, slightly more closely cross-striate in blotch, about 20 striae crossing median line in front of blotch, surface minutely granulate or wrinkled between striae; seta at posterior angles 64, brown, outstanding, other setae yellowish; mesonotum finely and closely striate with dark lines and finely wrinkled between the lines; anterior metanotal plate similarly sculptured; hind tibiae 196; fore wings 672, setae dark brown in dark areas, vein with 3 + 16-21 setae, I accessory seta in dark apical band. Abdomen 260 at segment IV; terga II-VI without posterior medial fringe.

BRAZIL: Itaguai, R. J., June 22, 1948, J. D. H., 8 ♀♀ (including holotype), from a vine.

Sericothrips maculicollis, sp. nov.

Agreeing only with *flavicollis* (among the Neotropical species which have dark cross-bands on the fore wings) in having (1) occipital apodeme confluent with posterior margins of eyes; (2) pronotal blotch indistinct, not uniform dark brown, faintly or not at all outlined; (3) antennal segment IV not pale apically and basally and darker between; and (4) head and abdominal segments II-IV and VII-IX brown or blackish; but with the area of pronotal blotch containing about four pairs of obscure pale gray dots, the striae in front of blotch rather widely spaced (3-5μ) and anastomosing at frequent intervals, the mesonotum with fine inter-strial lines, the dark band at middle of fore wings much broader than the white band beyond it, and segment III of antennae stout, about 2.3 times as long as wide.

♀ (macropterous).—Color dark brown and white, the head yellowish brown, shading behind the ocellar area and darker apodeme to nearly white at base; pronotal blotch distinct, yellowish, with about four pairs of somewhat coalescent, indistinct, gray clouds, remainder of pronotum white; mesothorax and abdominal segments VII-IX brown or blackish brown dorsally, the former yellowish brown ventrally, X nearly white but lightly shaded laterally, II-IV brown in lateral thirds, both dorsally and ventrally; metascutellum dark brown; legs with coxae shaded along sides with brown, their remainder pale yellow, with femora and mid and hind tibiae lightly shaded with brown at middle of upper surface, the hind femora more distinctly shaded, the hind tibiae and the tarsi yellow; fore wings dark in about basal seventh, then white for an equal distance, then dark to beyond middle, then with a white band equal in width to a following dark one, tip of wing pale but not white; antennae with segments I and II pale brownish or grayish, III-VIII brownish

gray, III slightly darker than II, with a dark line around extreme apex of the nearly colorless pedicel, III and V each with a pale line just beyond pedicel, III darkened again beyond the pale line and again beyond the setae; IV and V with pedicels dark, paler beyond, darkened in apical two-thirds; VI-VIII gray brown. Length about 1.1 mm. (distended, 1.3). Head 116, across eyes 163, across cheeks 143, at base 134, across frontal costa 16, frontal groove broadly rounded at bottom; sculpture normal, occiput finely and closely cross-striate with dark lines; occipital apodeme only slightly arched, confluent with posterior margins of eyes and of ocellar area; eyes 76, width about 45, interval about 74; mouth-cone short, dark, rounded at tip, extending about 43 beyond dorsal margin of head. Antennal segments: I 23(28), II 43(28), III 59(26), IV 61(24), V 47(18), VI 48(16-17), VII 12(6), VIII 14(4); sense-cones and chaetotaxy normal. Prothorax 118, across pronotum 196, closely cross-striate within blotch, smooth and more widely striate elsewhere, about 15 striae crossing median line in front of blotch; blotch faintly but completely outlined by brownish apodemes, the anterior one evenly arcuate, that forming posterior margin more strongly arched; seta at posterior angles 60, dark brown, outstanding, other pronotal setae pale brown; mesonotum and anterior metanotal plate finely and closely striate with dark lines and with fine inter-strial lines; hind tibiae 199; fore wings 752, setae dark brown in dark areas, vein with about 3 + 22, subapical dark band with one accessory seta. Abdomen 273 at segment IV, antecostal lines on II-VII complete and nearly black (except at sides of V and VI), VIII-X with a dark line along anterior margin; terga II-VI without medial posterior fringe.

BRAZIL: Serra da Cantareira, Franco da Rocha, S.P., June 11, 1948, J.D.H., Frederick Lane, and Lauro Travassos Filho, 6 ♀♀ (including holotype), from miscellaneous living vegetation.

Sericothrips flavicollis, sp. nov.

Agreeing only with *maculicollis* (among the Neotropical species which have dark cross-bands on the fore wings) in having (1) occipital apodeme confluent with posterior margins of eyes; (2) pronotal blotch indistinct, not uniform dark brown, faintly or not at all outlined; (3) antennal segment IV not pale apically and basally and darker between; and (4) head and abdominal segments II-IV and VII brown; but with the area of pronotal blotch not spotted with darker, the striae in front of blotch closely spaced (2μ) and anastomosing very infrequently (about 19 in front of blotch), the mesonotum without inter-strial lines or granules, the dark band at middle of fore wings about equal in width to the white band beyond it, and segment III of antennae about 2.8 times as long as wide.

♀ macropterous).—Color brown and yellow (or white), the head dark yellowish brown and paler anteriorly, abruptly nearly white behind the ocellar area and darker apodeme; pronotal blotch yellow, rest of pronotum white; mesothorax yellowish brown dorsally, metascutellum blackish brown, abdominal terga II and III grayish brown, segments VII-IX dark yellowish brown, X yellow but shaded along sides; terga II-VII with antecostal line blackish brown, II with two spots behind antecostal line near each side of body, III-VI each with one such spot at

sides; legs with coxae shaded along sides with brown, their remainder largely pale yellow, all femora and tibiae shaded at middle of dorsal surface with coalescing gray spots, hind femora more darkly; fore wings dark in about basal sixth, white in second sixth, dark again to middle of wing, then white for a slightly greater distance, and dark again to near tip, which is white; antennae with segments I and II nearly colorless, III very pale grayish yellow and narrowly shaded at tip beyond setae, IV darkened in pedicel and shaded in about apical half to dark brownish gray, its basal third slightly darker than III, V-VIII dark brownish gray, the pedicel of V slightly darker. Length about 1.1 mm. (distended, 1.2). Head 114, across eyes 166, across cheeks 157, across base 144, across frontal costa 16, frontal groove nearly semicircular as seen from above; sculpture normal, occiput finely and closely cross-striate with pale lines; occipital apodeme slightly arched, confluent with posterior margins of eyes and ocellar area; eyes 76, width about 45, interval about 76; mouth-cone short, dark, rounded at tip, extending about 60 beyond dorsal margin of head. Antennal segments: I 20(29), II 41(27), III 63(23), IV 61(20), V 46(18), VI 50(16), VII 13(6-7), VIII 14(5); sense-cones and chaetotaxy normal. Prothorax 133, across pronotum 190, very closely cross-striate, more closely within blotch, about 23 striae crossing median line in front of blotch, without interstrial roughenings; blotch outlined in front and behind by nearly colorless apodemes, the anterior one evenly arcuate, that forming posterior margin more strongly arched; seta at posterior angles 46, light brown, outstanding, other pronotal setae yellow, mesonotum and anterior metanotal plate finely and closely striate with dark lines, not granulate or roughened between lines; hind tibiae 230; fore wings 756, setae dark brown in dark areas, vein with about 3 + 19-25, no accessory setae. Abdomen 300 at segment IV, ante-costal lines on II-VII complete and nearly black, VIII-X with a dark line along anterior margin; terga II-VI without medial posterior fringe.

BRAZL: Ilha da Gipoia (near Angra dos Reis), R. J., May 25, 1948, J. D. H., 1 ♀ (holotype) from a dead branch, 2 ♀♀ from *Eleusine indica.*

Sericothrips paraensis, sp. nov.

Like *hemileucus* in the cross-banded coloration, the occipital apodeme not confluent with posterior margins of eyes, and the completely cross-striate area in front of pronotal blotch; but with abdominal segments VII-X all brown, and the seta at posterior angles of prothorax not conspicuous, pale in color, and curving inward along posterior margin.

♀ (macropterous).—Color dark brown and yellow (in life), the head yellow behind occipital line, its remainder and mesothorax and abdominal segments VII-X dark brown both dorsally and ventrally (X somewhat paler than the others), metascutellum dark brown, terga II-IV brown in lateral thirds, metasternum brown in modified posterior portion; pronotal blotch yellow; legs with coxae largely brown, hind femora irregularly brown in apical half (excepting their pale tips), hind tibiae and all tarsi yellow, fore and middle femora and tibiae yellow but each with faint gray spots at middle of upper surface; fore wings dark in basal seventh, then white for an equal distance, and white again at tip, the intervening portion gray but paler in its middle third; an-

tennae pale yellowish in segments I-III, the last of these distinctly darkened just beyond pedicel and obscurely slightly darker at apex, IV-VIII gray, IV paler in about basal third, V narrowly pale just beyond the dark pedicel. Length about 0.95 mm. (distended, 1.1). Head 103, across eyes 153, across cheeks 147, at base 138, across frontal costa 18; sculpture normal, occiput finely and closely cross-striate with pale lines; occipital apodeme dark, arched forward, separated from ocellar area and eyes about as far as diameter of an eye facet; eyes 60, width 41, interval 72; mouth-cone acute, extending 116 beyond dorsal margin of head. Antennal segments: I 21(29), II 38(26), III 56(21), IV 53(20), V 42(17), VI 50(17), VII 10(7), VIII 14(5); sense-cones and chaetotaxy normal. Prothorax 112, across pronotum 186, delicately cross-striate with pale lines which are closer together in blotch, about 17 medially in front of blotch, the latter with anterior apodeme pale and arcuate; seta at posterior angles 35, yellow, very inconspicuous, other setae pale; mesonotum and anterior metanotal plate very finely striate with dark lines and with a few inter-strial granules or lines; hind tibiae 179; fore wings 658, setae brown, paler in light areas, vein with about 3 + 17, no accessory setae. Abdomen 262 at segment IV, antecostal lines on II-VII complete and nearly black, VIII-X with a dark line along anterior margin; terga II-VI without medial posterior fringe.

BRAZIL: Belém, Pará, July 20 (3 ♀♀) and 23 (5 ♀♀, including holotype), 1951, J. D. H., sweeping in open field.

Scirtothrips multistriatus, sp. nov.

Very different from congeners in having interocellar setae arising about opposite middle of posterior ocelli, frontal costa very wide (29μ), head 1.7 times as wide as long and about equal in width to pronotum, head and pronotum exceedingly closely striate (striae about 1.3μ apart), and fore wings only 3.7 times as long as width of head.

♀ (macropterous).—Color yellow, with orange pigmentation in thorax and deep red ocellar pigmentation; obscurely shaded with gray between antennae, in pronotal foveae, along outer sides of metanotal plates, and at sides of abdominal segments II-VII, terga II-VII each with a blotch occupying all of median third (often broken at mid-line on II), VIII-X darkened posteriorly; antecostal line on II-VIII distinct, darkened, arched forward, and forming basal margin of blotch on II-VI, median third of that on VIII darkest; legs concolorous with body; fore wings gray throughout; antennae nearly colorless in segment I, dark gray beyond, II darker than III, the latter with pedicel yellow (except its darkened tip), narrowly clear just beyond, the swollen portion dark at base and in apical half, yellowish between, IV and V with their brief pedicels dark, paler just beyond, VI-VIII uniform gray. Length about 0.8 mm. (distended, 1.0). Head 87, across eyes 158, across cheeks 146, at base 122, the cheeks slightly arched, surface with extremely fine and close transverse striae (about 23 medially behind ocellar triangle); tip of mouth-cone about 74 behind posterior margin of head; eyes 66, about 41 wide and 76 apart; antennae normal, but with sense-cones on III and IV large, extending to or beyond middle of following segment, I 17(25), II 34(23-24), III 43(19), IV 43(18), V 34(15), VI 37(15), VII 7(6-7), VIII 12(4). Pronotum 101, width 158, surface not quite

as finely cross-striate as head (about 60 at median line), middle of three setae at each posterior angle 26 and darkest; mesonotum somewhat less closely striate than pronotum, anterior metanotal plate subreticulate medially; fore wings 574, setae dark gray, costa with about 28, fore vein with 10+3 (usually 3-4 near base, then a group of 4-7, followed usually by 3, rarely only 2, widely-spaced ones in apical two-fifths), hind vein constantly with 2 in apical third. Abdomen 248 at segment IV; terga II-VIII pubescent laterally, VIII with comb complete, IX pubescent in about posterior half; setae dark gray, IX with setae I and II 47-49, X with seta I 49.

BRAZIL: Belém, Pará, July 23, 2 ♀♀ (including holotype), 25 (1 ♀), 28 (1 ♀), 30 (3 ♀♀), 1951, J. D. H., adventitious on dead branches of *Hevea*, and on grasses.

Scirtidothrips, gen nov.

(*Scirt*[*othrips*]; εἶδος, appearance; θρίψ)

Closely allied to *Scirtothrips*. Head broader than long, concave in front, with median ocellus directed forward; interocellar setae largest, arising on sides of ocellar triangle, two pairs of small setae in a transverse line between eyes in front of ocelli, one small pair close together just behind posterior ocelli, and three or four pairs near eyes on cheeks, the latter rounded; dorsal surface very finely and closely striate; eyes strongly pilose; mouth-cone short and broadly rounded, maxillary palpi 3-segmented; antennae 8-segmented, formed as in *Scirtothrips*, with forked sense-cones on segments III and IV. Pronotum finely and closely cross-striate, with one pair of moderately long setae at posterior angles; mesonotum similarly striate; legs normal; fore wings normal, somewhat ensiform, with two longitudinal veins, the fore vein rather closely setose in basal two-thirds and with two setae beyond, hind vein closely setose throughout. Abdomen normal; terga II-VII with comb at sides posteriorly, VIII with complete comb; terga I-V otherwise without microtrichia, VI-VIII with a few at sides; median dorsal setae strong (except on tergum I), approximate, those on IX shorter than seta II.

Type species: *Scirtidothrips torquatus*, sp. nov.

Scirtidothrips torquatus, sp. nov.

♀ (macropterous).—Color pale yellow, with front of head nearly white and occipital apodeme (along posterior margin of head) dark gray-brown; abdominal terga II-VII each with a transverse gray dash anterior to antecostal line and a pair of obscure round spots at sides posterior to the line; ocellar area, and fore and middle femora and tibiae, sometimes perceptibly shaded with gray; fore wings uniform light gray with dark gray setae; antennae nearly colorless in segment I and dark gray-brown in II-VIII, II somewhat paler than those beyond, III with pedicel pale, IV and V briefly paler just beyond pedicel. Length about 1 mm. (distended, 1.2). Head 110, across eyes 140, just behind eyes 135, across cheeks 137, at base 119, most of dorsal surface very finely and closely cross-striate (the striae about 2μ apart), ocellar area smooth, the striae longitudinal just above frontal costa; interocellar setae 31, gray; eyes 66, approximately 36 wide and 68 apart; mouth-cone with tip about 56 beyond posterior margin of head; antennae with

segment I 19 (24), II 37(24), III 40(18), IV 44(17), V 37(17), VI 40(17), VII 7-8(7), VIII 13(5). Pronotum 117, width 153, surface sculptured throughout like head, seta at posterior angles 38, median of 3 pairs on posterior margin 23, about 5 smaller pairs on lateral margins, 5 pairs on anterior margin, and 8 or 9 on disc, all dark gray; mesthorax about 165 across anterior angles, 202 across widest point, metathorax 200 posteriorly; mesonotum smooth medially near posterior margin, remainder cross-striate like pronotum; anterior metanotal plate striate across base and along sides posteriorly, finely polygonally reticulate medially; fore wings 603, with about 27 setae on costal margin, 5+11-12+1+1 on fore vein, and 16-17 on hind vein. Abdomen with seta I on segment IX 50, II 67, III 56, X with I 61, II 68.

BRAZIL: Nova Teutonia, S. C., Jan. 16 (1 ♀), and Feb. 4 (1 ♀, holotype), 1949, and May, 1952 (1 ♀), Fritz Plaumann.

Prionotothrips, gen. nov.

(*πριονωτος*, serrated; *θρίψ*)

Allied to *Bregmatothrips*. Head longer than wide; vertex swollen, rounded, slightly surpassing and overhanging bases of antennae; interocellar setae very long, others short. Eyes prominent, protruding. Antennae 8-segmented, formed essentially as illustrated for type species of *Bregmatothrips*, but with sense-cones on segments III and IV forked. Mouth-cone broadly rounded at tip, not long, maxillary palpi 3-segmented. Prothorax longer than wide, trapezoidal, with nearly straight margins, with two pairs of long setae at posterior angles, other setae minute, surface nearly smooth. Wings long, slender, not noticeably broadened at base, with the two longitudinal veins rather sparsely setose. Fore tibiae with subterminal spine (not seta) on inner surface, hind tibiae with sparse comb of strong thorn-like setae along inner surface. Abdomen elongate; terga I-VIII each margined posteriorly with a continuous series of broad sharp teeth; sterna II-VII similarly margined, but with the teeth broken into groups by three pairs of small marginal setae, VII with median group wanting. Male with glandular areas on sterna III-VIII.

Type species: *Prionotothrips procerus*, sp. nov.

Prionotothrips procerus, sp. nov.

♀ (macropterous).—Color blackish brown, darkest in head; all femora, and mid and hind tibiae, about concolorous with body, the fore femora yellow at either end, other femora yellow at base only, mid and hind tibiae yellowish at apex, tarsi and fore tibiae yellow, the latter irregularly clouded with brown along upper surface; fore wings pale yellowish; antennae bright yellow in segments III and IV, remainder about concolorous with body, II with outer apical surface yellow, III narrowly colorless just beyond pedicel, V with pedicel nearly yellow. Length about 1.6 mm. (distended, 1.9). Head 158, across eyes 137, across cheeks 114, across base 106, across the very shallowly emarginate frontal costa 11, occiput and vertex cross-striate; cheeks slightly convex, essentially subparallel; four small but strong dark setae curved across vertex midway between median ocellus and frontal costa and five pale slender pairs across head behind eyes; interocellar setae long (60) black

and strong, arising just behind median ocellus on edges of ocellar triangle; eyes 83, rounded, protruding laterally; mouth-cone 126, broadly rounded at tip; segment I of antennae 23(33-34), II 40(30), III 53(20), IV 46(20), V 48(20), VI 64(20), VII 15(8), VIII 17(6). Pronotum 195, width 186, faintly sculptured throughout with well-spaced anastomosing pale lines (as illustrated for several species of *Chirothrips*); setae at posterior angles slender and pointed, outer 60, inner 80; mesothorax 220 across anterior angles, 238 at widest point, metathorax 221 posteriorly, both rather long; fore tibial spine tooth-like; fore wings 924, with 23-25 moderately long setae on costal margin, fore vein with 3 near base and 5-6 beyond, only 2 in apical half, posterior vein with 9-10. Abdomen 269 at segment V, terga rather faintly cross-striate at sides and base, III-V near base with one or more of the striae asperate, VI-VIII with three or more such series of asperae, IX cross-striate in basal half, X divided nearly to base; setae on IX and X nearly black, IX with I 101, II 153, III 127, X with I 98, II 105.

♂ (macropterous).—Essentially like ♀ in color and structure.

BRAZIL: Nova Teutonia, S. C., November 20, 1949, Fritz Plaumann, 1 ♀ (holotype).—Boracéa, Munic. de Salesópolis, S.P., June 5, 1948, J.D.H., 1 ♂ (allotype), from dead branches.

Enneothrips (Enneothripiella) fuscus, sp. nov.

Readily known from *flavens* (the only other member of the subgenus) by the dark brown or blackish brown color of the head, thorax, and abdomen, and by the largely yellow third to fifth antennal segments.

♀ (macropterous).—Color dark brown, with fine, black lines of sculpture; femora brown, hind pair darkest, all pale at base; tibiae and tarsi pale yellow, the former shaded for a short distance beyond base; fore wings dark gray-brown, nearly colorless in second ninth except along costal margin; antennae with segments I and II concolorous with body and darkest (I paler across base), VI-IX gray brown, III-V pale yellow, IV and V lightly shaded in about apical two-thirds and two-fifths, respectively. Length about 1 mm. (distended, 1.2). Head 107, across eyes 144, just behind eyes 0.131, across cheeks 133, at base 121, the cheeks nearly straight (and converging) behind level of posterior margins of eyes; dorsal surface with fine, raised cross-lines which project conspicuously beyond outline of cheeks, a few of the spaces with faint interlineations; chaetotaxy normal, the setae black; occipital apodeme black, marginal; eyes 67, width 46, interval 53; ocelli about 16 in diameter, posterior pair 17 apart and 12 from median ocellus; mouth-cone with tip broadly rounded and about 77 beyond posterior dorsal margin of head, maxillary palpi 3-segmented; antennae normal, almost precisely as illustrated for type species, except that the lines of sculpture on segment II project strongly, shelf-like, I 20(26), II 36(23, exclusive of sculpture), III 40(16-17), IV 48(17), V 41(15), VI 38(16), VII 14(9-10), VIII 10(7), IX 15(5). Pronotum 111, width 155; seta at posterior angles 49; striae more closely spaced than in type species, with frequent fine interlineations; mesonotum finely striate, anterior sclerite of metanotum reticulate medially in posterior half, striate elsewhere; fore wings 637, typical. Abdomen 218 at segment IV, lateral thirds of most terga with dark microtrichia arising from lines of sculp-

ture except at extreme sides; setae nearly black, I-III on IX 52-53, I and II on X 63-64.

BRAZIL: Corcovado, Pará (Marajo Isl., near Breves), August 14, 1951, J. D. H. and F. Camargo, several females from dead branches with leaves.

Schistothrips, gen. nov.

(σχιστος, divided; θρίψ)

Allied to *Oxythrips*. Head large, subquadrate, with nearly straight, subparallel cheeks and non-protruding, widely separated eyes; frontal costa broad; vertex not produced or elevated, with two pairs of small setae in front of median ocellus, one pair behind posterior ocelli, and three behind eyes, the interocellar setae much longer and stouter; mouth-cone normal, rounded at tip, maxillary palpi three-segmented; antennae short, nine-segmented, with complete suture between VI and VII and forked sense-cones on III and IV. Thorax normal; pronotum with one pair of major setae at posterior angles; legs moderately short, fore tarsi with a small terminal hook; fore wings normal, slightly ensiform, banded in type species, with the two veins and costal margin set with rather evenly-spaced setae. Abdomen with posterior margins of terga and sterna II-VII produced into a thin flange, the sternal flanges interrupted and slightly overlapping at each of the three pairs of marginal setae; tergum VIII with complete long comb; median dorsal setae close together, dorsal pores at bases of flanges.

Type species: *Schistothrips quadratus*, sp. nov.

Schistothrips quadratus, sp. nov.

♀ (macropterous).—Color blackish brown, with red internal pigmentation; legs concolorous with body except for yellow tarsi and tips of tibiae; fore wings colorless in distal fifth and in all of proximal third except extreme base, the middle portion dark gray-brown; antennae blackish brown in segments I, II, and VI-IX, the intervening segments largely yellow, III lightly infuscate in swollen portion, IV and V darkened beyond setae; major setae nearly black. Length about 1.2 mm. (distended, 1.4). Head 122, across eyes 144, across cheeks 140, across base 127, across frontal costa 15, surface with dark anastomosing cross-lines 5-8μ apart which produce a serration of the cheeks, the latter straight and nearly parallel except where rounded to base; interocellar setae 32 long and 39 apart, arising just outside ocellar area; ocelli about 13 in diameter, posterior pair 41 apart and 23 from median ocellus; eyes 60, width 36, interval 72; mouth-cone with tip about 84 behind dorsal margin of head; segment I of antennae 18(26), II 35(25), III 36(22), IV 37(20), V 34(19), VI 34(18-19), VII 10(13), VIII 10(7), IX 15(5). Pronotum 125, width 162, with a few dark striae along anterior and posterior margins, smooth elsewhere; seta at posterior angles 50, other setae small, four pairs along posterior margin; mesothorax 188 across anterior angles, 218 at widest point, metathorax 211 posteriorly; mesonotum closely striate with dark lines; fore wings 560, with about 21 setae on costal margin, 4+9-11+1 on anterior vein, and 9-10+1 on posterior vein. Abdomen 249 at segment V, dorsal and ventral surfaces with widely-spaced cross-lines which form a light reticu-

lation laterally, dorsum of VII and VIII nearly smooth medially; IX with seta I 89, II 109, III 98, X with I and II 86-88.

BRAZIL: Nova Teutonia, S. C., October 15-November 26, 1949, 16 ♀♀ (including holotype taken Nov. 17-18), from various unidentified plants.

Pseudothrips longiceps, sp. nov.

Closely related to *spadix*, but with head longer than wide and longer than pronotum, last three antennal segments together equal to VI, posterior margins of abdominal terga not fringed laterally with microtrichia, VII without comb, and fore wings much paler in basal fourth (exclusive of the dark anal area).

♀ (macropterous).—Color blackish brown, darkest in head and abdomen, with bright red internal pigmentation in thorax and abdomen; all femora concolorous with body; all tibiae and tarsi bright yellow, the former vaguely clouded at middle; fore wings dark brown in anal area and apical three-fourths, basally nearly white; antennae with segments I and II blackish brown (II yellowish at apex), III and IV yellow, IV with a narrow dark band involving bases of setae and sense-cones but pale beyond, V and VI yellow in basal three-fifths and two-fifths, respectively, their remainders and VII-IX gray-brown. Length about 1.4 mm. (distended, 1.7). Head 169, across eyes 155, just behind eyes 143, across cheeks 150, across base 140, cheeks rounded, vertex depressed, frontal costa narrow (6μ) and very shallowly emarginate, occiput with a few anastomosing cross-striae, interocellar setae very long (89) and only 17 apart, arising directly behind median ocellus; eyes 93, width about 49, interval about 57; mouth-cone short, maxillary palpi 3-segmented; antennae normal, 9-segmented, IV vasiform, I 26-27(33), II 42(29), III 63(22), IV 59(21), V 47(18), VI 44(20), VII 13(12), VIII 12(9), IX 18(6). Pronotum 133 (shorter than head), width 179, nearly smooth at middle, with deep dark cross-striae in posterior fifth and distinct anastomosing lines in anterior third, seta at posterior angles 94 and nearly black, median pair on posterior margin 42 and 60 apart, also dark; mesonotum sculptured like anterior part of pronotum, anterior metanotal plate delicately polygonally reticulate; fore wings 846, costa with 24-26 setae, fore vein with 17-19, hind vein with 12-13, all setae nearly black, very finely pointed, and equally spaced. Abdomen 281 at segment V, without microtrichia, comb present only on VIII, sterna without accessory setae; setae on IX and X long and pointed, nearly black, IX with I 138, II 195, III 167, X with I 140, II 138.

BRAZIL: Serra da Cantareira, Franco da Rocha, S. P., June 11, 1948, J. D. H., Frederick Lane, and Lauro Travassos Filho, 1 ♀ from leaf of *Yucca*.

Anaphidothrips, gen. nov.

(*Anaph*[*othrips*]; εἶδος, appearance; θρίψ)

Like *Poëthrips* and *Baliothrips* in most respects, but with 3-segmented maxillary palpi, pores on abdominal terga far in front of posterior margins, and only one pair of setae on head in advance of ocelli, these setae much longer than others on head. Head longer than wide, slightly produced between eyes and antennae, vertex not swollen or overhanging,

posterior ocelli slightly behind middle of head; mouth-cone short, rounded; antennae 7-segmented, segments III and IV with forked sense-cones. Prothorax relatively long and slender, with two pairs of long slender setae at posterior angles; fore wings pointed, little broadened at base, with two longitudinal veins, the fore vein with few setae (3 in type species) in distal two-thirds, the hind vein rather evenly and closely setose in distal two-thirds; legs normal. Abdomen normal, without comb on tergum VIII, setae on terminal segments long and slender.

Type species: *Anaphidothrips brasiliensis*, sp. nov.

Anaphidothrips brasiliensis, sp. nov.

♀ (macropterous).—Color of head, body, and legs pale yellow; fore wings pale yellowish gray, slightly darker at base of anal area and along veins; antennae yellow in segments I-IV, gray-brown beyond, IV lightly shaded apically, V yellowish in about basal fourth, VI and VII somewhat darker. Length about 1.1 mm. (distended, 1.3). Head 136, across eyes 123, just behind eyes 113, across cheeks 116, across base 103, axial length between eyes and antennae 8, width of prolongation at eyes 71, its width at antennae 62, surface lightly cross-striate behind ocelli, smooth in front of them; cheeks evenly arched to eyes and to base, nearly smooth; one pair of large (35) pale yellow frontal setae 48 apart and with bases 20 in front of median ocellus; other setae small, one pair close to eyes and opposite middle of median ocellus, another pair about 5 behind posterior ocelli and external to their outer margins, and about five pairs behind eyes and on front part of cheeks; eyes 67, width 35, interval 53; mouth-cone with tip about 63 behind posterior margin of head; antennae with segment I 20(27), II 34(23), III 40(16), IV 36(16-17), V 36(17), VI 50(16), VII 19(7); sense-cones on III and IV forked, very short. Pronotum 134, width 145, surface with a few distinct striae paralleling posterior margin, very faintly striate elsewhere; setae at posterior angles slender and pointed, outer 43, inner 47, median of three pairs on posterior margin 17; mesothorax 175 across anterior angles, 192 at widest point, metathorax 182 posteriorly; mesonotum with very faint and well-separated cross-striae, anterior plate of metanotum distinctly and closely longitudinally striate; fore wings 620, with about 21 setae on costal margin, fore vein with about 4 + 3 in basal third and 1 + 1 + 1 beyond, hind vein with about 12 evenly-spaced ones in apical two-thirds. Abdomen 223 at segment V, nearly smooth medially, at sides with faint widely-spaced diagonal striae of which one on each of terga IV-VII is asperate; IX with seta I 93, II 113, III 120, X with I 101, II 94.

BRAZIL: Campo Grande, D. F., June 28, 1949, J. D. H., A. da Costa Lima, and Aristóteles G. d' Araujo e Silva, 3 ♀♀, from *Andropogon* (probably *condensatus* Kunth).

Plesiothrips maculosus, sp. nov.

Allied to *perplexus* by the 7-segmented antennae, divided tergum IX of abdomen, and one pair of setae in advance of interocellars, and resembling it in the relatively pale abdomen; but with occipital setae much closer to posterior ocelli than to base of head and somewhat farther apart than posterior ocelli, head more produced (13 μ) between

eyes and antennae, this process narrowed anteriorly (83 at base, 74 at apex), the body and legs almost wholly brownish yellow, with obscure gray spots, especially along sides of intermediate abdominal segments, the head narrowly but heavily shaded behind eyes and across front, the abdomen much darkened in sides of last segment.

♀ (macropterous).—Color brownish yellow, with head shaded on sides behind eyes, narrowly edged with blackish brown between eyes and antennae, along insertions of antennae, and in frontal costa, the ocellar area palest, pterothorax and abdomen with obscure gray spots, terga II-VII each with a pair of such spots occupying lateral fifths, VIII-X darkened laterally, X darkest; legs about concolorous with body, paler in tarsi, ends of tibiae, and bases of femora; antennae dark gray-brown in I, II, and V-VII, tip of II and all of III yellow, IV brownish yellow, darkened at base and in apical three-fifths; fore wings yellowish, middle third with the two veins light brown. Length about 1.2 mm. (distended, 1.6). Head 158, across eyes 142, behind eyes 129, across cheeks 130, at base 116, length in front of eyes 30, between eyes and antennae 14; surface with pale cross-striae behind eyes; ioc. 39, longest, arising within ocellar triangle, about as far apart as posterior ocelli; 1 small pair laterad of median ocellus, on line with front margin of eyes; occ. small (17), on line with hind margin of eyes, 44 apart; 3 pairs behind eyes, outermost largest (23) and 103 apart; 2 pairs on cheeks close to eyes; eyes 69, about 35 wide and 73 apart; ocelli 13, the median one with hind margin on line with front margin of eyes, 29 from posterior ocelli, these 33 apart; mouth-cone 95. Antennal segments: I 27(36), II 34(29), III 40(24), IV 52(23), V 35(20), VI 59(21), VII 26(9); chaetotaxy and sense-cones typical. Prothorax 127, exclusive of coxae 155 wide, without distinct sculpture, chaetotaxy normal, ep. 56, pm. 73; mesothorax 185 across anterior angles, metathorax 199 posteriorly, fore wings 683. Abdomen 227 at segment V; IX with seta I 145, seta II on IX and I and II on X 178-180.

BRAZIL: Nova Teutonia, S. C., November 17-18, 1949, Fritz Plaumann, 1♀, holotype.

Coremothrips nubilicus, sp. nov.

Differing from *pallidus* in having (1) antennae 8-segmented, darker, and stouter: segment VI without transverse suture, either dorsally or ventraly, IV heavily shaded with gray-brown, III 46 x 17 μ; (2) major setae on prothorax and wings mostly shading from yellow at base to brown at apex; and (3) interocellar setae extending only a little beyond tip of antennal segment II.

♀ (macropterous).—Color of body and appendages uniform pale yellowish white, excepting only segments IV-VIII of antennae (which are gray-brown, with IV paler—especially basally) and the am., pm., and major setae on fore wings (which shade from yellow at base to brown at apex). Length about 0.9 mm. (distended, 1.1). Head 110, across eyes 103, behind eyes 89, across cheeks 93, at base 85, surface smooth except for three or four complete transverse striae behind eyes; ioc. and poc. tremendously enlarged, hooked and pinnatifid apically, supported by prominent tubercles, the former (64) extending beyond tip of antennal segment II and 11 apart at bases, the latter pair (60)

somewhat slenderer, only 3 apart at bases, and arising 17 in advance of posterior margins of eyes; 2 pairs of minor setae flanking median ocellus; 1 pair at inner posterior margins of eyes, 1 behind eyes near cheeks, 2 on cheeks; eyes protruding; median ocellus directed forward and overhanging; mouth-cone 100, rounded at tip, labial palpi slender, maxillary palpi 3-segmented. Antennal segments: I 16(21), II 30(23), III 46(17), IV 40(16), V 37(17), VI 37(13), VII 8(6), VIII 10(4); setae slender, pointed, colorless; sense-cones on III and IV U-shaped. Prothorax 117, width (exclusive of coxae) 122, smooth, but with a pale transverse apodeme at posterior third; 4 pairs of major setae formed like those on head and arising from tubercles, am. 82, aa. 68 (these close together and on same transverse line), ep. 72, pm. 80 (these also on same transverse line); other setae few, minute, pointed, colorless; mesothorax 152, metathorax 136 posteriorly; fore wings 525, venation and chaetotaxy typical. Abdomen 132 at segment IV, very long and very slender, nearly free of sculpture, all setae minute excepting I and II on IX and I on X, these formed like ones on head and respectively 107, 45, and 77.

♂ (macropterous).—Like ♀ in all essentials of color and structure, except as follows: antennal segment IV slightly impressed on outer surface just in front of sense-cone; abdominal tergum IX with a median bulbous process about 23 long and 30 wide, from which extend two slightly converging finger-like structures which are about 29 long and 5 wide at middle, with rounded tips, from the outer apical surface of each of which arises a small pointed seta, the bulbous base with two pairs of similar setae on ventral surface of apex.

BRAZIL: Nova Teutonia, S. C., Fritz Plaumann, Oct. 15-20, 1949 (1 ♀, paratype, on *Dahlbergia*); Nov. 20, 1949 (1 ♂, allotype); and May, 1952 (3 ♀♀, holotype and paratypes).

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A NEW CHAETANAPHOTHRIPS FROM FORMOSA, WITH A NOTE ON THE BANANA THRIPS

By J. Douglas Hood

The vector of banana rust has consistently been called *Scirtothrips* (or *Anaphothrips*) *signipennis*, but unfortunately the species belongs to neither of these genera and furthermore has an older specific name. While pointing out these facts below, it has seemed best to clarify our knowledge further by differentiating a new Formosan species with which it has been confused in the literature.

Chaetanaphothrips machili, sp. nov. (Figs. 1 and 2)

1928. *Anaphothrips* (*Chaetanaphothrips*) *orchidi* (sic) [misidentification], Moulton, Annot. Zool. Jap., 11:291.

1936. *Anaphothrips orchidii* [misidentification], Takahashi, Phil. Journ. Sci., 60(4) :430.

Very closely allied to *orchidii*, but orange (rather than lemon-yellow) in color, with antennal segments VII and VIII shorter and stouter (Figs. 1 and 3), ovipositor shorter (199-211 μ, in comparison with 238-266 μ), setae on abdominal tergum IX stouter (I about 5 μ in diameter near base, instead of about 4), X with distinct anastomosing longitudinal striae, and nymph of Instar II with long, prominent teeth on posterior margin of abdominal tergum IX (Figs. 2 and 4); pupates on host plant, instead of in soil.

♀ (macropterous).—Color bright orange, deeper in pterothorax, more yellowish in abdomen, this color due to internal pigmentation; legs yellow; fore wings dark blackish gray in basal fifth and in third and fourth fifths, remainder nearly colorless, the demarcation of the pale apical band not sharp; antennae yellow in segments I-IV and in basal two-thirds of V and basal half of VI, remainder dark gray, II with internal orange pigmentation, IV very obscurely shaded apically. Length about 0.9 mm. Head about 98 μ long, width across eyes 144, just behind eyes 131, across cheeks 135, near base 130, cheeks narrowed somewhat more abruptly to eyes than to base, occiput with three strong cross-striae which produce a serration of cheeks, remainder of dorsal surface nearly smooth; two pairs of minute setae across front about on line with anterior margin of median ocellus, another similar interocellar pair about as far apart as posterior ocelli and on a line with anterior margin of latter, three pairs close to inner angles of eyes, and three larger pairs (14 μ), one of these last behind outer angles of eyes, the other two on cheeks and a little farther forward, one below the other; eyes 67 μ, width 44, interval 57, sparsely and very briefly pilose; ocelli

16-17 μ in diameter, posterior pair about 21 apart; mouth-cone rounded at tip and extending 74-80 μ beyond dorsal margin of head, maxillary palpi 3-segmented; antennae normal, sense-cone on III and IV U-shaped, long, extending to or beyond setae on following segment, I 23(30), II 33(25), III 47(19), IV 44(19), V 41(19), VI 49(16), VII 11(7), VIII 17(5). Pronotum 116 μ long, width 176, surface smooth except for a few faint striae along anterior and posterior margins; third seta from median line on posterior margin about 27 μ, fifth about 15, other prothoracic setae smaller and few in number, all pale; pterothorax normal, greatest width 234 μ; fore wings typical, 630 μ long, costal margin with about 19 pale setae, fore vein usually with 1 + 3 + 3 in basal half or less and 1 + 1 + 1 beyond, hind vein with about 4 widely-separated similar ones. Abdomen normal, 255 μ wide at segment IV; X with distinct anastomosing longitudinal striae; setae on IX stout, I 84 μ long and about 5 in diameter near base, II 85, III 99; I on X 81, II 70.

Nymph, Instar II.—Integument pale, underlain in head, thorax, and first nine abdominal segments with orange and red pigmentation, the latter confined to sides of thorax and abdomen and more abundant in latter; antennal segment I 20(31), II 23(22), III 37(23), IV 44(21), V 8(16-17), VI 12(12), VII 23(7); tergum IX of abdomen (Fig. 2) strongly toothed along elevated posterior margin, three or four of the teeth median and arising from a distinct prominence, the others at sides, all variable in form.

Pupa.—Color as in nymph; tergum VIII with posterior margin elevated to form a transverse hump whose overhanging hind margin is minutely denticulate; posterior margin of X with four diverging, equidistant, strong, horn-like teeth (the median two slightly heavier) which arch upward and a little forward, the longer median pair about 47 μ long.

Type.—FORMOSA: Chikushiko, August 18, 1935, 8 ♀♀ (including holotype), 4 nymphs of Instar II, and 2 pupae, from *Machilus* leaf. In his paper cited above, Mr. Takahashi notes that this species "is not found on orchids,"—a statement which he entered also on his slide labels. He states that leaves of young trees of *Machilus* are attacked, and that the leaves become rolled along the margin, with the lower surface in. Because the pupae were mounted by him on the same slides with nymphs and adults, with the above data on the labels, it is obvious that the species pupates without leaving the leaves.

Chaetanaphothrips orchidii (Moulton) (Figs. 3 and 4).

The Banana Thrips

1907. *Euthrips orchidii* Moulton. Tech. Ser. 12, Bur. Ent., U. S. Dept. Agr., Pt. III, p. 52, Figs. 15-18.

*1914. *Scirtothrips signipennis* Bagnall, Ann. Mag. Nat. Hist., (8) 13: 22.

*1924. *Euthrips biguttaticorpus* Girault, in Lĕse Majestè, New Insecta, and Robbery (privately printed), Gympie, Australia.

*1925. *Euthrips biguttaticorpus* Girault ["new species"!], Ins. Insc. Menstr., 13(1-3) :34.

*——. *Euthrips musae* Tryon, MS. (nomen nudum).

*New synonymy.

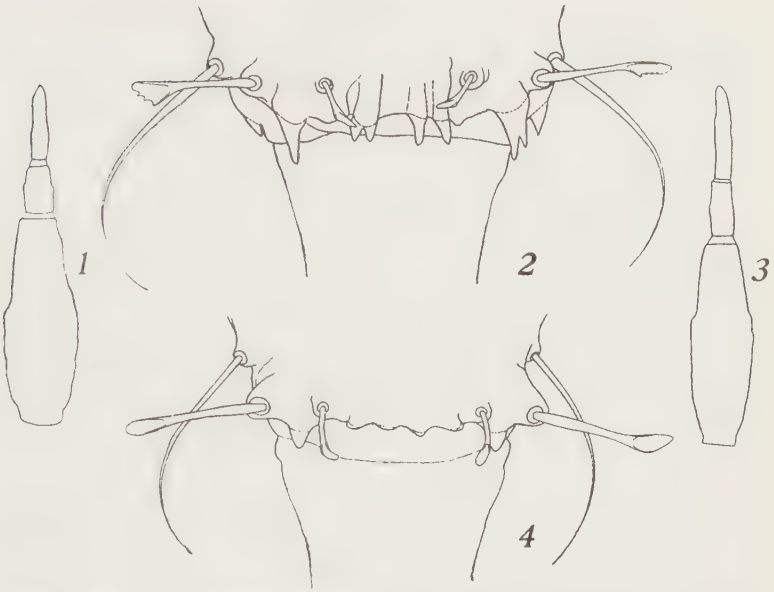

Fig. 1.—*Chaetanaphothrips machili*, sp. nov., segments VI-VIII of right antenna; ♀, paratype; x 430.

Fig. 2—*C. machili*, tergum IX and base of X; nymph, Instar II; paratype; x 430.

Fig. 3.—*C. orchidii* (Moulton), segments VI-VIII of right antenna; ♀, paratype of *Euthrips biguttaticorpus* Girault, from Queensland; x 430.

Fig. 4.—*C. orchidii*, tergum IX and base of X; nymph, Instar II, collected with the paratype referred to immediately above; x 430.

It is unfortunate that the name of the banana thrips must be changed from *Scirtothrips signipennis*, or *Anaphothrips signipennis*, to *Chaetanaphothrips orchidii*—especially as the latter specific name is both inappropriate and incorrectly formed. However, there can be little doubt that the two names are synonymous. Through the kindness of Dr. Edward S. Ross, of the California Academy of Sciences, where the Moulton collection is deposited, I have been able to study the two "types" of *orchidii* still remaining in the collection, and to compare them with specimens of Girault's type series of *Euthrips biguttaticorpus*, described from bananas in Queensland. The unique type of *Scirtothrips signipennis* Bagnall is unfortunately unavailable for study, because deposited in the British Museum; but that name was based upon a specimen from banana, taken in Ceylon, and the description applies perfectly to *orchidii*. Other workers on the group have similarly been convinced that the name *signipennis* is applicable to the present species, and have used that name consistently for all material taken from banana, in Australia and elsewhere.

An element of consusion exists, though, because Bagnall used the name *orchidii* as early as 1908, for specimens taken in greenhouses in England, Belgium, and France (I have material from all three countries, sent by him in 1908 and 1936), and yet himself proposed the name *Scirtothrips signipennis* in 1914. Were the species not so distinctive in color, one would be justified in thinking that two species, instead of one, might be involved. But Dr. H. Priesner has independently identified, as *Chaetanaphothrips orchidii,* a Brazilian specimen which I sent to him, and in a letter dated April 20, 1954, tells me that he has a note in his index which reads as follows: "A slide from Girault under this name (*Sc. signipennis*) is identical with *Chaetanaphothrips orchidii* (Moulton)."

The species is well distributed. I have specimens from Australia, Fiji, Panamá, Trinidad, Brazil, Honduras, Costa Rica, and Florida—all taken out-of-doors and from a varied assortment of plants, but never from orchids—as well as the specimens from greenhouses in England, Belgium, and France, referred to above. Excepting for the records of the species from Formosa, most of the other records are probably based upon correctly determined material .

Two structurally different forms of the species exist: (1) a somewhat larger form, with a pair of minute setae closely flanking the median ocellus and with a glandular area near the base of the third, and sometimes the fourth, abdominal sternum; and (2) a parthenogenetic form which is somewhat smaller and which lacks the structures mentioned. The first form is always accompanied by males and is presumably diploid, while the second is found only when males are wanting and is therefore probably haploid. Both forms are found on banana.

Moulton's types are of the parthenogenetic form; and as no selection of holotype was made by him, I am designating one of them as the LECTOTYPE, at Dr. Ross's suggestion, and am so labeling it.

It is interesting that the species occurs only rarely on orchids out-of-doors, though reportedly injurious to them in greenhouses, and that, unlike *machili,* described above, it pupates in the soil, both in Australia and the tropics of the New World.

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PUERTO RICAN WATER-STRIDERS (HEMIPTERA)

By Carl J. Drake[1] and J. Maldonado Capriles[2]

Very little is known about the aquatic hemipterous fauna of Insular America, and the literature dealing with the known species is widely scattered. The present paper is an attempt to bring together published records on the occurrence of water-striders in Puerto Rico and also to include data from the collections of the University of Puerto Rico and authors. Most of the unpublished records herein are based upon a study of specimens collected by Dr. H. D. Tate in 1936-37 and during the past two years by the junior author. One species of the genus *Microvelia* is described below as new to science. As it is plainly evident from the literature, the water-strider fauna of Puerto Rico is poorly represented in collections, and several genera and many species are as yet to be netted in the island.

In *"Insectae Portoricensis"* (Jr. Dept. Agr. Porto Rico, 7(1):1-313, 1923; and Supplement, *loc. cit.*, 7(4):38-43, 1924), Wolcott gives a very good review of the literature and publishes a preliminary list of all species of insects known to occur in Puerto Rico. This author included the specific names of five species of water-striders as follows. Family Gerridae: *Tenagogonus* (*Limnometra*) (*quadrilineatus*, Champion; and *Limnogonus marginatus*, Guérin-Meneville (=*Limnogonus franciscanus* Stål). Family Veliidae: *Microvelia albonotata* Champion; *Microvelia pulchella* Westwood; and *Rhagovelia angustipes* Uhler. In the latter family, Wolcott also included an undetermined water-strider as *Mesovelia* (=family Mesoveliidae, probably *Mesovelia mulsanti* Buchanan-White).

In a comprehensive survey of the Hemiptera-Heteroptera of Puerto Rico, (N. Y. Acad. Sci., 14(3):263-411, 63 figs, 1939), Barber enumerated 12 species of water-striders divided among four families as follows. Family Mesoveliidae: *Mesovelia mulsanti caraiba* Jaczweski (p. 393). Family Hydrometridae: *Hydrometra consimilis* Barber (p. 406; type locality). Family Gerridae: *Rheumatobates imitator* Uhler (p. 407); *Limnogonus franciscanus* Stål (p. 407); *Gerris remigis* Say (p. 408); and *Gerris cariniventris* Champion (p. 409). Family Veliidae: *Microvelia pulchella* Westwood (p. 410); *Microvelia robusta* Uhler (411) (=*Microvelia incerta* Kirby); *Microvelia capitata* Guerin-Meneville (p. 411) (wrongly named =*Microvelia albonotata* Champion); *Microvelia*

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paludicola Champion (p. 413); *Rhagovelia collaris* Burmeister (p. 413); and *Rhagovelia plumbea* Uhler (p. 414). (*Trochopus plumbea* Uhler). Barber (p. 414) also states that *Rhagovelia augustipes* of Walcott (*loc. cit.*, p. 244) is probably the same as and thus should be referred to *R. collaris*.

The following data are taken from specimens of water-striders in the collections of the authors, all from Porto Rico. The list of 21 species includes all but two of the species catalogued by Walcott and Barber, and these two (*Gerris remigis* and *Trochopus plumbea* Uhler) makes a total of 23 different species now known to inhabit waters of Porto Rico.

Family *Hebridae*

Merragata foveata B.—White: Catagena Lagoon, June 9, 1946.

Family *Hydrometridae*

Hydrometra consimilis Barber: Cartagena, Lagoon, Jan. 15, 1954.
Hydrometra sp.; Immature female, Cartagena Lagoon, Jan. 15, 1954. Very different from *H. consimilis*.

Family *Gerridae*

Gerris cariniventris Champion: Mayaguez and Maricao, 1936 & 1937.
Tenagogonus quadrilineatus Champion: Maricao, 1936.
Limnogonus franciscanus (Stål): Mayaguez & Maricao, 1936.
Telmatometra whitei Bergroth: Mayaguez, 1936.
Telmatometra ujhelyii Esaki: Mayaguez, 1936.
Metrobates laudatus Drake & Harris: Juan Diaz, Rio Pidros, March 21, 1936.
Rheumatobates minutus Hungerford: Mayaguez, 1936.
Rheumatobates imitator (Uhler): Mayaguez, 1936.

Family *Veliidae*

Microvelia paludicola Champion: Mayaguez, Jan. 30, 1954.
Microvelia pulchella Westwood: Mayaguez and Maricao, 1936; Mono Island, Apr. 16-18, 1954.
Microvelia incerta Kirby (=*M. robusta* Uhler): Mayaguez, Maricao, Mono Island.

This species and *M. pulchella* are very common, widely distributed and often taken together in the same schools. *Robusta* is probably just a subspecies of *pulchella*, and separated largely on size.

Microvelia longipes Uhler: Mayaguez, 1936 and Feb. 15, 1954.
Microvelia albonotata Champion: Mayaguez, 1936 and Feb. 15, 1954.
Microvelia hinei Drake: Cartagena Lagoon, Jan. 15, 1954.
Microvelia mimula B.—White: Mayaguez, Feb. 1, 1954; Adjuntas, artificial pool, Feb. 12, 1954.
Microvelia tateiana Drake: Maricao, May 10, 1936.
Microvelia portoricensis Drake: Mayaguez, Apr. 4, 1936; Maricao, 1936; Larza, 1930.
Microvelia zillana Drake, Mayaguez, April 4, 1936.

Microvelia argusta, n. sp.

Apterous form (*male*): Small, brownish testaceous with a few blackish marks and some bluish pruinose; pubescence brownish; dorsal sur-

face with some very fine brownish hairs; (more numerous on sides of abdomen) body beneath testaceous. Head convex above, with median punctate line becoming blackish anteriorly, with bluish adjacent to eyes. Rostrum testaceous with apex blackish, reaching to middle of mesosternum. Eyes large, reddish fuscous. Antennae slender, clothed with pubescence and numerous long hairs, fuscous with basal part of first segment and usually basal half or more of undersides of second and third segments (sometimes also a little of fourth) whitish testaceous-measurements—I, 17; II, 14; III, 25; IV, 26.

Pronotum with small punctures, broadly produced posterior so as to conceal slightly more than half of mesonotum, slightly more than twice as wide as median length (48:21), longitudinally ridged on median line, to hind margin wide and slightly concave (almost truncate); mesonotum less than half as long as pronotum. Legs moderately long, with femora nearly equal in thickness, unarmed in both sexes, testaceous with all tarsi, superior faces of tibiae and apical half or more of the dorsal surfaces of femora (only narrow apical part of fore femora) brown; tarsi of middle and hind legs nearly equal in length; anterior tibiae with a short apical comb; measurements-anterior femora 0.50 mm. long, the tibiae 0.40; middle femora 0.54 mm. the tarsi 0.50; hind femora 0.68 mm., the tibiae 0.78 mm. Abdomen slightly narrowed posteriorly, last tergite not quite twice as long as preceding segment, with black mark on each side of the second and third tergites, these form spots and the penultimate tergite bluish, venter without spines or tubercles. Male genital segments not very large, testaceous; segment one beneath deeply broadly roundly excavated behind; third segment without lateral spines. Length, 1.90 mm.; width, 0.75 mm.

Female: Larger than male, but with color, markings, legs and antennal measurements about the same. Connexiva wider, nearly upright, not reflexed behind. Last dorsal tergite about one-half longer than preceding segment.

Macropterous form: Pronotum moderately convex, blackish with a transverse band a little behind collar and a broad, median, longitudinal strip extending behind disc flavous, bluish with a few silvery hairs in front; humeri moderately elevated; width across humeral angles greater than median length (66:56). Head mostly black with a broad brown stripe on each side of median impressed line, with sides adjacent to eyes quite bluish. Hemelytra as long as abdomen, brownish testaceous with the apical two-fifths blackish fuscous; area in cells in basal half somewhat whitish, with five silvery white spots in darkened half-four just beyond the middle (two spots in median cell) and one spot in apical cell. Length, 2.31 mm.; width, 0.85 mm.

Type (male) and *allotype* (female), both apterous, Mayaguez, Feb. 1, 1954, in Drake Collection. *Paratypes:* 2 males, one alate, same data as type.

Very much like *M. mimula* B.-White in size, color and markings, but easily distinguishable by the smaller male genital segments and unarmed hind femora. In *mimula* the hind femora of the male are spined beneath and the penultimate ventrite bears a small tubercle at the middle near the hind margin; the first genital segment is widened apically and widest at the hind margin, and the tenth tergite (3rd genital segment) bears on each side a very long lateral spine.

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NEW WATERSTRIDERS FROM BRAZIL (HEMIPTERA)

By Carl J. Drake[1] and José C. M. Carvalho[2]

The present paper contains the description of one new species of Gerridae (Genus *Rheumatobates* Bergroth) and two new species of Veliidae (Genus *Microvelia* Westwood) from Brazil. The types have been deposited as stated in the descriptions. The measurements employed in the descriptions are to the same scale and such that 80 units equal one millimeter.

In a subsequent paper the authors plan to publish an annotated list of the waterstriders of Brazil. The junior author and colleagues are collecting many specimens of aquatic and other Hemiptera in the primitive forests of Brazil, where very little or no collecting at all has been done.

Microvelia parana, n. sp.

Macropterous form: Head moderately convex, brownish with median impressed line, sides adjacent to eyes and apex black-fuscous. Antennae slender, moderately long, rather shortly densely pilose, with last two segments quite slender, measurements—I, 16; II, 10; III, 22; IV, 33. Rostrum testaceous with last segment infuscate. Eyes large, reddish brown. Legs with femora nearly equal in thickness in both sexes, unarmed and without singular structure modifications, brownish with coxae, trochanters and bases of femora testaceous.

Pronotum blackish fuscous with a transverse flavous band in front, moderately convex across humeri, wider across humeral angles than median length (58:46), sparsely clothed with very short yellowish pubescence, with median longitudinal ridge fairly distinct on disc. Entire body beneath and sides (save connexiva) black-fuscous, with considerable bluish pruinose; abdomen above testaceous with sutures between segments narrowly embrowned. Hemelytra fuscous with two longitudinal stripes at base and three to five rounded spots beyond middle silvery white. Female broader and stouter than male. Apterous form unknown.

Male: Slenderer than female; genital segments embrowned, moderately large. First genital segment above with hind margin slightly concave at middle, beneath deeply broadly rounded excised behind; second segment beneath with a long finger-like elevation (ridge) on each side. Abdomen beneath without spines or tubercles.

Length, 1.90-2.20 mm.; width, 0.70-0.82 mm.

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Type (male) and *allotype* (female), Belem, Para, Oct. 9, 1938, Hambleton and Sauer, Drake Collection. Paratypes: 1 specimen, taken with type; 3 examples, Paru River, Para, Dr. Calvalho; and 3 specimens, Chapada, Bras.

On account of the prominent rounded ridges, on the inferior surface of the second genital segment of the male, this new species is probably most closely related to *M. sarpta* Drake and Harris. However, the male of the later has much longer antennae (seg. III, 35; IV, 45), inordinately large and somewhat laterally compressed intermediate femora and longer rounded ridges on inferior side of second genital segment. The third genital segment (tenth tergite) is devoid of lateral spines in both species.

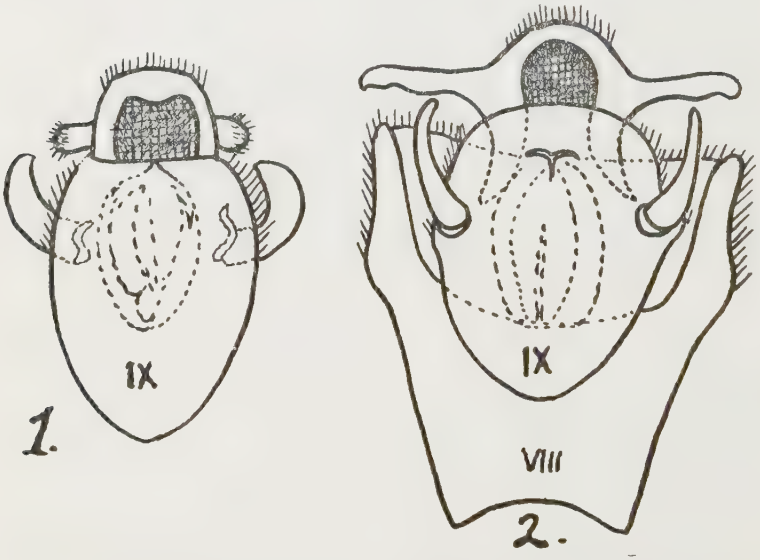

Fig. 1. *Microvelia quieta*, n. sp., male genitalia, 9th and 10th tergites.
Fig. 2. *Microvelia mimula*, B.—W., male genitalia, 8th-10th tergites.

Microvelia quieta, n. sp. (Fig. 1)

Apterous form: Small, slender, brownish testaceous with the fuscous and bluish pruinose markings somewhat variable as noted in structural descriptions. Antennae slender, shortly pilose, dark fuscous with basal part of first segment testaceous, measurements—I, 16; II, 11; III, 21; IV, 33. Head reddish brown with impressed median line, sides bordering eyes and apex blackish fuscous; eyes large, dark fuscous. Rostrum testaceous with last segment dark fuscous, reaching to the middle of mesosternum. Legs unarmed in both sexes, with femora nearly equal in thickness, testaceous with most of dorsal surface of femora (save anterior pair) fuscous: first and second tarsal segments of both middle and hind legs almost subequal.

Pronotum testaceous or brownish testaceous with anterior third (sometimes as much as two-thirds) blackish fuscous and with a large transverse band slightly back of front margin flavous, darkened area also, with some bluish bloom, with punctures rather small and not prominent, broadly projected posteriorly, covering about half of mesonotum, with hind margin slightly concave at middle, with transverse row of punctures separating fore and hind lobe small and not prominent, much wider at middle than median length (43:24); hind lobe twice as long as front lobe. Abdomen above brownish, with one or two basal tergites blackish and two or three tergites in front of last tergite pale testaceous; tergites slightly tapering posteriorly; connexiva with segments largely testaceous; abdomen beneath testaceous, the sides of thorax and abdomen (save connexiva) blackish. Female broader than male, usually also darker with more bluish pruinose on dorsal surface; connexiva slightly wider than in male, not strongly reflexed behind.

Male: Slenderer than female; abdomen beneath devoid of tubercles or spines. Hind legs scarcely stouter than middle pair; tibiae beneath with a row of unusually long brownish hairs, each hair about twice as long as the diameter of the segment. Genital segments moderately large (fig. 1); first segment above with hind margin truncate, beneath broadly roundle notched behind; third segment with a small lateral spine on each side. Parameres rather broad, curved inwardly.

Length, 1.85-2:00 mm.; width, 0.65-0.80 mm.

Type (male) and *allotype* (female), Camo do Rio Claro, Minas Geraes, Brazil, Museu Nacional (Rio de Janeiro). *Paratypes*: 11 specimens, same data as type. Winged form unknown.

In size and general appearance, the apterous form of this species is quite similar to *M. mimula* B.—White (fig. 2) and *M. cubana* Drake, but differs in having the hind tibiae of the male provided with long hairs on inferior surface. The male of *mimula* (fig. 2) also has a small tubercle at the middle of the hind margin of the penultimate ventrite, and the tenth tergite (third genital segment) armed on each side with a long lateral spine.

Rheumatobates curracis, n. sp.

Macropterous form: Small, velvety reddish brown with the anterior part of pronotum testaceous or orange-testaceous; hemelytra dark fumose with the veins dark fuscous; head dark velvety brown with the pale brown, crescent-shaped spot extending anteriorly along the margins of the eyes. Eyes large, fuscous. Antennae dark brown with basal segment testaceous, with the usual long bristly hairs, unmodified in male, measurements—I, 20; II, 8; III, 21; IV, 18. Rostrum fuscous, shining, with tip extending slightly beyond prosternum.

Pronotum large, slightly convex, impressed on median line in front of disc, with pubescence yellowish golden (testaceous in front), with humeral angles slightly raised, rounded behind, the median length and width across humeri subequal (56:54). Hemelytra very long, much longer than abdomen, with transverse breaking suture and median longitudinal streak pale, the basal marginal vein wide, with a row of hairs near outer edge. Abdomen above dark fuscous, with connexiva dark brown. Pro- and mesosternum pale testaceous; metasternum and

venter (last segment testaceous in female) dark reddish fuscous. Coxae and trochanters of all legs and anterior femora testaceous; middle and hind femora basally slightly testaceous, basally beneath testaceous. Apterous form unknown.

Male: Legs and antennae straight, unmodified. Genital segments rather long, above testaceous with last segment a little embrowned, beneath testaceous; last ventrite longer than the preceding segment, truncate behind. Anterior femora beneath with several extremely long, stiff, bristly, dark brown hairs.

Female: Very little larger than male. Genital segments long, testaceous with cylindrical apical part dark brown.

Length, 1.85 mm. (to apex of abdomen, 2.50 mm. (including hemelytra); width, 0.70 mm. (across humeri).

Type (male) and *allotype* (female), Eironepe, Rio Jurua, Amazonas, Brazil. 1950, Jose C. M. Carvalho, Museu Nacional (Rio de Janeiro). *Paratypes*: 3 specimens, taken with type.

Separated from *R. bonariensis* (Berg) and other South American members of genus having straight appendages by the color as well as structural differences.

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NEW VENEZUELAN GERRIDAE (HEMIPTERA)

By Carl J. Drake[1] and Janis A. Roze[2]

This paper is a report on a collection of waterstriders of the family Gerridae taken by the junior author in Venezuela. In addition to the new forms, several other interesting species are also listed: *Gerris kahli* Drake and Harris, El Limon, Maracay, Aragua, altitude 450 meters, Nov. 11, 1953; Bejarana, Miranda, altitude 1,200 meters, Oct. 8, 1952; and San Antonio de los Altos, Miranda, 1,200 meters, May 2, 1953. *Cylindrostethus palmaris* Drake and Harris, alate specimens only, El Limon, Maracay, 450 meters, Nov. 11, 1953. *Potamobates horvathi* Esaki, Aparicion, Portoguesa, May 2, 1953. *Charmatometra bakeri* Kirkaldy, Guacharo, Monages, Aug. 5, 1953; and La Culebra, Miranda, 1,200 meters, July 4, 1952. *Brachymetra anduzeei* Drake and Harris, El Limon, Maracay, Aragua, 450 meters, Nov. 11, 1953; Cerro Avila, Dist. Fed. 1,200 meters, Aug. 16, 1952; La Culebra, Miranda, altitude 1,000 meters, July 4, 1952; Puerto de Hierro, Sucre, Aug. 10, 1951; Guatopo, Guarico, 1,300 meters, June 1, 1952; and El Trompillo, Carabobo, 1,300 meters, June 26, 1952. *Trepobates trepidus* Drake and Harris, Cerro Avila, Fed. Dist., 1,200 meters, Aug. 16, 1952; El Trompillo, Carabobo, 450 meters, June 26, 1952; and Tinoco, Cojedes, May 3, 1953.

Fig. 1. *Metrobates curracis,* n. sp. Right paramere of male.

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Metrobates curracis, n. sp. (Fig. 1)

Blackish with median part of pronotum, a wide median longitudinal stripe and a narrower one on each side of mesonotum, most of metanotum, nearly entire dorsal surface of pronotum, and almost entire body beneath bluish pruinose. Pubescence, short, brownish or grayish. Antennae blackish fuscous with basal fourth of first segment and basal third of second testaceous; segment I with long pale hairs on inferior surface; II and III with usual apical modifications, measurements—I, 40; II, 30; III, 22; IV, 30.

Pronotum short, narrower than head including eyes, twice as wide as long (70:30), with a quadrate brownish spot in discal impression. Mesonotum large, slowly widening posteriorly, twice as wide at base as median longitudinal length (140:72); mesosternum with a distinct median longitudinal line, unarmed. Anterior legs dark fuscous with coxae, trochanters and nearly basal half of femora testaceous; femora without ventral spine, with usual enlargement at apex. Middle legs dark fuscous with trochanters testaceous; femora and tibiae within with long hairs; femora 2.75 mm. long, the tibiae 4.20 mm. Hind legs also dark fuscous with trochanters testaceous, the femora 4.25 mm. in length. Last segment of venter almost twice as long as preceding. Male parameres widened apically, widest at apex (Fig. 1).

Female: Broader than male, but with color, markings and antennal measurement practically the same as in male. Last segment of venter almost three times as long as preceding. Winged form unknown in both sexes.

Length: 3.20-3.70 mm.; width 1.80-2.10 mm.

Type (male) and *allotype* (female), both apterous, Caño Araguao, Delta Amacuro, Venez., Dec. 27, 1952, in Drake Collection. *Paratypes:* male and female, same data as type.

The male parameres (fig. 1) of this waterstrider are very distinctive and separate it at once from all of its congeners. This is the fourth species of the genus *Metrobates* Uhler recorded from South America, the first record for Venezuela.

Potamobates vivatus, n. sp.

Apterous form: Bluish black with a large median spot (isosceles triangle) and either a large median spot or short broad stripe on anterior part of head flavotestaceous; a moderately wide stripe on each side of both thorax and abdomen, narrow hind margin of mesonotum, dorsal surface of both meso- and metathoracic acetabula, and a narrow stripe on each side of abdominal tergites clothed with bright silvery pubescence tinged with bluish pruinose. Entire body beneath and inferior parts of sides of both thorax and first genital segment flavotestaceous. Length, 12.00 mm. (male; apex of head to end of genital segments and 8.75 mm. (female; apex of head to hind margin of last tergite) or 11.50 mm. (female; including extremely long posterior projection of genital segment); width, 2.60 mm. (male) and 3.10 mm. (female).

Head with greatest width across eyes longer than median length (130:104); vertex less than the width of an eye. Rostrum blackish with base testaceous, scarcely reaching to front coxae. Antennae blackish fuscous,

measurements—I, 144; II, 52; III, 50; IV, 70. Anterior legs: coxae and trochanters testaceous, the latter with a narrow fuscous stripe on inferior side; femora stout, largely testaceous with inferior surface blackish, 2.75 mm. long. Middle and hind legs very long, slender, dark fuscous with coxae and most of trochanters testaceous; length of middle femora 9.50 mm., the tibiae 6.50 mm. Length of hind femora 10.00 mm., the tibiae 5.50 mm.

Male: Abdomen beneath sulcate on median line, deeply roundly notched at middle behind, median length above 2.30 mm.; connexiva moderately wide, slightly produced behind, there obliquely truncate. First genital segment very long, thick, subcylindrical, slightly longitudinally convex above, a little concave beneath, produced posteriorly on hind margin of right side (just under dorsal edge) into a moderately large projection, which terminates in a point and is directed slightly downward, the median dorsal length of segment twice the width at middle (90:45); second genital segment produced on left side into a flat, tapering, arcuate projection (broad at base) which curves upward in a latero-posteriorly direction and terminates in a slender tip above the projection on the right side of the first genital segment.

Female: Body a little stouter and shorter than male; color, markings and antennal segments very similar. Connexiva produced posteriorly in a long subcylindrical process (longer than last tergite), and also clothed with longer pubescent hairs. Genital segment brownish or testaceous with the apical two-fifths blackish, produced posteriorly into an extremely long, rounded, tapering, stemlike process, the stem of which is 2.35 mm. long and nearly as long as the abdominal tergites conjoined, the entire segment (including hind projection) as long as the abdomen. Winged forms unknown.

Type (male) and *allotype* (female), Avila, D. F., Venezuela, in Drake Collection. *Paratypes:* 12 specimens, taken with type, and from Belen, Carabobo.

This species may be distinguished at once from *P. peruvianus* Hungerford and other members of the genus by the position of the projection on right end of the first genital segment in male, and the inordinately long, posteriorly-pointed, stemlike process of the female genital segment. The modification of the female genital segment is peculiar to *vivatus*.

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SIX NEW CALIFORNIA MILLIPEDS

By Ralph V. Chamberlin

Four of the six new millipeds of which preliminary diagnoses are here given are represented in a collection recently made by Clarence R. Quick, by whom they were sent to me for identification. Occasion is here taken to validate names for a new *Hypozonium* collected by P. H. Arnaud in 1949 and a new *Klansolus* represented by specimens belonging to the American Museum, specimens that were collected by Cazier, Gertsch and Schromel of that institution. Type of all the species excepting the last named are in the author's collection.

Klansolus mononus new species

Resembling *K. yosemitensis* Chamberlin in having a broad lighter colored dorsal stripe bisected by a median dorsal dark line; legs chestnut or somewhat chocolate colored.

Separated from *yosemitensis* chiefly on the basis of differences in the gonopods of the male, especially in the details of the terminal appendage of the posterior pair. In this the mesoproximal process or spine is nearly straight instead of being strongly curved and smaller and less divergent. In the anterior gonopods the subterminal tooth of the coxal process is relatively smaller and more remote from the apical point or tooth.

Number of segments 77, or near that number.

Diameter, 5 mm.

Locality.—Mono Co.; Leevinning. Two specimens taken July 13, 1952, by Cazier, Gertsch, and Schromel. (American Mus. Coll.).

Klansolus obscurans new species

While adults of this species typically lack the median dorsal light band, or show it vaguely in strong light, young specimens have it distinctly developed and with the usual bisecting dark line.

Otherwise, this species differs from *mononus* in having the mesoproximal branch of the distal appendage of the posterior gonopods with a branch or spur. The anterior gonopods differ, e.g., in the coxal process in having the subapical tooth closer to the apex and relatively much longer than in that species.

Number of segments, 77-79.

Diameter 4.6-5 mm.

Locality.—Butte Co.: Big Bar Mt., 2 to 2½ mi. southwest of Coyote Gap (Faggin's Saddle), Plumas N. F., east of Pulga. Six specimens taken under bark of rotten stump and under wood debris on moist ground, July 1, 1953.

Paeromopus buttensis new species

General color black, but dorsally the metazonites are reddish chestnut, the band of this color narrowing and running out down the sides; head, antennae and legs black.

Segmental sulcus deeply impressed throughout, curving ventrocaudad about the pore and then continuing ventrad directly. Prozonites smooth and the metazonites strongly striate in the usual manner.

In comparison with *P. eldoradus* Chamberlin, which it in general resembles, differing conspicuously in the gonopods; e.g., the larger size of these organs, with the furcate coxal hook of the anterior pair having the proximal branch large and characteristically dentate on the margins instead of being small and smooth. The retrorse barb at distal end of posterior gonopods well developed in the present species while absent or obsolete in *eldoradus*.

Number of segments, 75-81.

Length of male holotype, 145 mm.; diameter, 7.8-8 mm.

Locality.—Butte Co.: Big Bar Mt. Ridge, east of Pulga, 2 to 2½ miles S. W. of Coyote Cap (Fagin's Saddle). El. about 4,000 ft. (?) Three specimens taken July 1, 1953.

Family Polyzoniidae

Genus **CALZONIUM** new

Legs separated by well developed sterna. Head acutely pointed below, conical. Ocelli in two oblique rows which are typically but narrowly separated at the middle. Antennae with sixth article longest, the third next, with the fourth and fifth subequal to each other. Body strongly narrowed from the sixth segment forward. First tergite covering the head from above, less than half the width of the median tergites. Segments numerous, with the body typically ten or eleven times as long as broad.

Generitype.—*Calzonium quicki* new species.

Apparently closest to *Euzonium* with which it differs from the other known genera in possessing well developed sterna, excepting *Buzonium*. It agrees with *Euzonium* and differs from *Buzonium* in the conically pointed head. Whether it agrees with *Euzonium* in having the anal tergite covered by the penult tergite is at present uncertain since these segments are absent from the type of the present genus. The great difference in number of segments and in proportions, the length being ten or more times the width while but four times, or less, in *Euzonium*, seems sufficiently indicative of generic difference.

Calzonium quicki new species

Dorsum orange brown with a narrow yellow stripe over each lateral border; venter and legs yellow; antennae of a dull purplish cast.

Sixth joint of antennae longest, cylindrical; the third but little longer than the fourth and fifth. Ocelli black, their series not far from transverse.

Head fully covered from above by the first tergite which is nearly as long as the succeeding two taken together.

None of the legs crassate.

Number of segments 85 plus two or three missing from caudal end of type.

Length, 38 + mm.; width, 3.9 mm.

Locality.—Mariposa Co.: about ¾ mi. N. of Signal Peak, Chowchilla Mt., Elevation about 6,400 ft. One female taken June 20, 1953, under debris on moist ground.

Hypozonium arnaudi new species

Of nearly the same proportions as recorded for *H. anurum*, but with 35 segments instead of 30. An obvious difference from that species is in the shape of the large penult tergite, the caudal margin of which is widely incurved instead of convex. There are but two definite ocelli in each series in the present species instead of three. The ventral end of the head is more blunt than is represented for *anurum*.

The antennae are purplish and the head has two or three subvertical lines of the same color on each side of the face. The dorsum along the middle dark brown, lighter brown on each side with the lateral border orange and an obscurely lighter stripe on each side of the median brown area. Venter and legs light orange. The legs with their distal joints irregularly blotched with purplish.

Length, 8.8 mm.

Locality.—Santa Cruz Co.: Felton. One female taken Feb. 6, 1949, by P. H. Arnaud.

Family Androgonathidae

Eucybe auctus new species

Tergites salmon colored excepting the anterior segments which, together with head, antennae and legs are pale yellow to nearly white.

The head elevated, freely exposed, the part below level of insertion of antennae very short, its lower margin convex; head clothed with fine hair points as in *clarus*. Antennae with sixth joint much longer than any other; seventh joint well developed, in the form of a truncate cone.

The collum with well developed keels which are upturned as are those of the other tergites, nearly of same width as the head; tubercles laterally compressed as typical, but these form three transverse series instead of two; the tubercles of caudal row large, those of anterior row small and scarcely compressed, those of the middle series intermediate in size; tubercles in last two series eight in number, those of the anterior series six.

Tubercles of the other tergites with tubercles in two series, those of each series 12 or 10 in number; tubercles not extending upon the keels. Surface of all tergites densely clother with fine hair points.

Number of segments, 52.

Length, about 15 mm.; body slender.

Locality.—Mariposa Co.: Chowchilla Mt., about ¾ mi. N. E. of Signal Peak. Elevation 6,450 ft. Under wood debris on damp ground. One male and two females taken June 20, 1953.

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A NEW JAY FROM MEXICO

By Robert T. Moore, *Zoological Laboratory, Occidental College, Los Angeles, California*

A recently collected series of blue-crested jays of the species, *Cyanocitta stelleri*, from Xichu in extreme northeastern Guanajuato nearly completes the last segment of the rim of a circle (about 280 miles in diameter), marked by pockets of breeding blue-crests. Within this circle are several groups of black-crested jays, apparently isolated from the vast habitat of black-crests of northwestern Mexico and western United States. The local habitats of the blue-crests range in altitude from approximately 5000 feet to 8500 feet, whereas habitats of the black-crests within the circle, located chiefly on the higher mountain peaks (Toluca, Ajusco, Tetela del Volcan, Ixtaccihuatl and Popocatepetl) range up to as high as 13000 feet. The difference in altitude of the two groups may or may not be significant. Outside of the circle, there extends a range of black-crests in the northwest from Alaska to southern Durango which is matched to the south of the circle by a range of blue-crests from Guerrero, México to the highlands of Nicaragua.

The known states around the rim of the circles, in which our collection of 80 specimens of blue-crests have been taken, beginning at the west, are west-central and eastern Michoacán, northeastern Guanajuato, Hidalgo, Veracruz (Mirador and La Puerta—31 miles by road southwest of the town Orizaba), Puebla and central Guerrero (Cuapongo, Chilpancingo and Cerro Teotepec at 11,500 feet). To complicate this abnormal circular distribution, apparent intergrades, blue and black-crests, have been collected at the same localities, notably at Cofre de Perote north of Mt. Orizaba, Veracruz and at La Puerta, 31 miles S.W. by road from the town of Orizaba, Veracruz. Considering the blue-crest populations alone, the palest and lightest blue birds are found at the north (Zichu, Guanajuato) and at the south (Honduras and Chiapas, Mexico), whereas the dark race, darker than either *coronata* from Guanajuato to the north or the western rim of the "circle" in Michoacán.

The loss of the type of the blue-crest, described as *Garrulus coronatus* Swainson is unfortunate. The type locality has been designated twice, namely by Brodkorb (Auk, 61, 1944, 403) as Real del Monte, Hidalgo; and second by Davis (Auk, 62, 1945,281) as the "vicinity of the Cofre de Perote," Veracruz. Aldrich (Proc. Biol. Soc. Wash., 57, June 28,

1944, 23), who saw Dr. Davis' M.S. before publication, accepts Davis' reasoning as "justified." Whichever decision is preferred, the birds from these two areas, both north of Mt. Orizala, are similar. Our four April individuals from Xichu, Guanajuato are somewhat paler above and below, but may be tentatively referred to *coronata*. South of Mt. Orizaba we find several areas of intergrades, such as the one at La Puerta, mentioned above, where both blue-crests and black-crests (*azteca*) are found. Our series of 16 breeding May blue-crests from 11,500 feet on Cerro Tectepec in central Guerrero represent an undescribed dark race, darker than either *coronata* from Guanajuato to the north or *ridgwayi* from Chiapas to the south, but lighter than *purpurea* of west central and eastern Michoacán, its nearest race geographically. It is this race, which I describe herewith:

Cynanocitta stelleri teotepecensis subsp. nov.

Type.—Male adult in breeding plumage; number 45899, collection of Robert T. Moore, Occidental College; Cerro Teotepec, Sierra Madre del Sur, Guerrero, México; altitude 11,500 feet; May 26, 1947; collected by Chester C. Lamb.

Subspecific characters.—Differs in breeding plumage from *Cyanocitta stelleri purpurea* Aldrich of west-central Michoacá in having white throat patch much larger and always present; crest, particularly posterior portion, much bluer; back much bluer, less blackish; underparts much brighter, less purplish blue; lower throat blue, less purplish; rump lighter blue. Differs from *C. s. ridgwayi* of Chiapas and Guatemala in having white on lower eyelid more restricted, often absent; crest, particularly posterior portion, much darker blue; back darker, less bluish. Differs to a great degree from the black-crest, *C. s. azteca* of the state of México in having blue colored crests, instead of black; and purplish blue backs instead of blackish gray. Differs from the Blue-crest, *C. s. coronata of* "the vicinity of Cofre de Perote," as well as the birds of Hidalgo and Guanajuato, in being much darker both above and below. The birds immediately south and southwest of Mt. Orizaba consist of such a mixture of black-crests and blue-crests that no comparison is possible, except that *teotepecensis* is darker than either in its blue colors.

Measurements.—Measurements are not significantly different from the other races, with which I have compared *teotepecensis* above.

Range.—*Teotepecensis* expresses its characters best in the series of 8 males and 8 females in our collection from the 11,500 foot altitude on Cerro Teotepec, reputedly the highest mountain in the Sierra del Sur of Guerrero, which is not shown on most maps, but is approximately 40 miles in an air-line west of Chilpancingo and 25 miles northwest of San Vicente de Benitez. In his journal Chester C. Lamb estimates the altitude of the highest peak as 12,150 feet above sea level. Birds of localities at lower altitudes in Central Guerrero from 5,000 to 7,000 feet in elevation (Chilpancingo, Cuapongo, Omilteme) are somewhat paler in coloration, but nearer to *teotepecensis* than to any other race.

Remarks.—It is important in this species to compare individuals of the same approximate period of molt. The entire topotypical series of *teotepecensis* was secured in the breeding season during the month of May, a May 22nd female having large eggs, but the breeding season in

the species extends from April to July. I was fortunate to have specimens of this period from every race compared above. We also have a very large series of birds in fresh plumage from late September to March, as well as breeding individuals, from the lower mountain areas of Guerrero so that comparisons of breeding and winter plumage birds of all races could be made. The chief effect of wear in all races of the species *stelleri*, is most apparent on the back, which changes to brownish gray in the black-crests and to brownish purple in the blue-crests.

My thanks are extended to Dr. Herbert Friedmann and the United States National Museum for the loan of the topotypical series (except for the type) of both breeding and winter plumage birds of *C. s. purpurea*, which was employed by Dr. Aldrich in describing this race. Dr. Friedmann also forwarded two critical specimens of *coronata* from Mirador and Las Vigas, Veracruz, to supplement our own from the same general area.

Specimens examined.—All specimens mentioned herein are from the Moore Collection at Occidental College, unless specified as otherwise: A group of 95 specimens of *macrolopha* and of *diadematа*; 7 specimens from Cerro Potosí, Nuevo León, which are nearer *diadematа* than *azteca;* 3 specimens from eastern Michoacán, which have bluer crests than *purpurea,* are best classified as that race; 8 specimens from west central Michoacán, the topotypical series of *purpurea,* mentioned in the preceding paragraph; the following specimens of *coronata,* 4 April breeding birds from Xichu, Guanajuato; 2 specimens (U.S. Nat. Mus.) from Las Vigas and Mirador, Veracruz, near the Davis-designated type locality of *coronata;* 7 specs. from Hidalgo (4 from the Brodkorb-designated type locality of Real del Monte and 3 from El Mineral del Chico); 6 specimens from La Puerto southwest of Mt. Orizaba consisting of intergrades, 3 of them nearer *coronata,* 1 with a much lighter blue crest similar to low altitude birds of central Guerrero, 1 with the *azetca* black crest and 1 in between; 1 black-crested individual from El Venerable, Puebla; 51 specimens of intergrades between *teotepecensis* and *ridgwayi* (nearer the former) from the lower mountains (5000 to 7000 feet) of south-central Guerrero. 16 specimens constituting the topotypical series of *C. s. teotepecensis* from Mt. Teotepec, Guerrero; 39 intergrades *teotepecensis* x *ridgwayi,* from Chiapas (Teopisca, Ciudad Las Casas, Volcán Tacaná), 4 specimens of *C. s. ridgwayi* from Alto Cantoral, Honduras.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NATURAL HISTORY OF PLUMMERS ISLAND, MARYLAND[1]

XI. BLUE-GREEN ALGAE (MYXOPHYCEAE)

By Francis Drouet

This list of blue-green algae is presented in continuation of the series of studies of the fauna and flora of Plummers Island and the adjacent mainland property of the Washington Biologists' Field Club in Montgomery County, Maryland. It includes 32 species and two varieties, of which three species (indicated by an asterisk) are so far known only from the mainland property. All the records relate to the island itself except those of the three species marked by an asterisk and also localities for *Pophyrosiphon notarisii, Schizothrix purpurascens,* and *Symploca muralis,* which are entered under the respective specific names. Collections of blue-green algae have been made by E. P. Killip, Jason R. Swallen, E. C. Leonard, Donald Richards, Harold B. Louderback, and myself. Specimens are deposited in the cryptogamic herbaria of either the Smithsonian Institution or the Chicago Natural History Museum, or both. I am indebted to Mr. Leonard and C. V. Morton for checking this list against material in the National Herbarium.

Chroococcaceae

Anacystis montana (Lightf.) Dr. & Daily. In a pool in rocks, south shore, Drouet, Killip, & Richards 5555, Aug. 6, 1944.

Coccochloris stagnina Spreng. In rock pool, upper end, Leonard 3071, Nov. 1, 1953.

Merismopedia thermalis Kütz. In shallow water of the channel, Drouet, Killip, & Richards 5533, Aug. 6, 1944.

Stigonemataceae

Fischerella ambigua (Born. & Flah.) Gom. In open ground throughout the island, Drouet & Killip 3948 (with *porphyrosiphon notarisii*), 3953,

[1]The following numbers of this series have been published previously: I (Introduction), Proc. Biol. Soc. Wash. 48: 115-117, 1935; II (Flowering plants and ferns), op. cit. 118-134; III (Mosses), op. cit. 135-137; IV (Birds), op. cit. 159-167; V (Fungi), op. cit. 49:123-131. 1936; VI (Reptiles and amphibians), op. cit. 50:137-139. 1937; VII (Hepaticae), 52:21-22 1939; VIII (Lichens), op. cit. 23-26; IX (Mammals), op. cit. 131-134; X (Flowering plants and ferns, Supplement 1), op. cit. 66:31-38. 1953.

3964, July 24, 1941; Drouet, Killip, & Swallen 3907, 3921, July 23, 1941; Drouet, Killip, & Richards 4883, 4884, 4885, 4888, July 18, 19, 1942; Drouet, Killip & Louderback 8509, Aug. 15, 1948; Leonard 2877 (with *Nostoc muscorum*), Nov. 2, 1941.

Nostocaceae

Anabaena variabilis Born. & Flah. In a shallow pool, Drouet, Killip, & Swallen 3906, July 23, 1941.

Cylindrospermum muscicola Born. & Flah. In wet ground, Drouet, Killip, & Swallen 3901, 3939, July 23, 1941; Drouet, Killip, & Richards 4905, July 19, 1942.

Nostoc commune Born. & Flah. On wet open ground, Drouet, Killip, & Swallen 3922, July 23, 1941; Drouet & Killip 3942, July 24, 1941; shallow rock pool, west end, Leonard 2852, Nov. 3, 1940.

Nostoc muscorum Born. & Flah. Mudbar at entrance to channel, Killip 36527, Aug. 31, 1941; mud, west end, Leonard 2877, 2878, Nov. 2, 1941; in low and wet ground, Drouet, Killip, & Swallen 3917, 3923, 3925 (with *Schizothrix stricklandii*), Drouet & Killip 3940, 3950 (with *Microcoleus paludosus*), 3958, 3960, 3961, July 24, 1941; in alluvial ground, Drouet, Killip, & Richards 4906, July 19, 1942.

Nostoc sphaericum Born & Flah. In a shallow pool, Drouet & Killip 3967, July 24, 1941.

Rivulariaceae

Amphithrix janthina Born. & Flah. In rain-pools in rocks, Drouet, Killip, & Richards 4907, 4910, July 19, 1942.

Calothrix parietina Born. & Flah. On an open bank, Drouet & Killip 3956, July 21, 1941.

Scytonemataceae

**Tolypothrix tenuis* Born. & Flah. In shady pool on mainland, Drouet, Killip, & Richards 4894a, July 19, 1942.

Oscillatoriaceae

Lyngbya aestuarii Gom. On wet ground and in pools along the river, Drouet, Killip, & Swallen 3905, July 23, 1941; Drouet & Killip 3951, July 24, 1941; Leonard 2879, Nov. 2, 1941; Drouet, Killip, & Richards 5559, Aug. 6, 1944.

**Lyngbya ochracea* Gom. In pool on mainland, Drouet & Killip 3969, July 24, 1941.

Lyngbya putealis Gom. On rocks in river near boat landing, Leonard 2827 (with *Symploca muralis*), Nov. 6, 1938; in a shallow pool, Drouet, Killip, & Swallen 3928, July 23, 1941; on rocks in water, south shore, Drouet, Killip, & Richards 5560, Aug. 6, 1944.

Microcoleus lacustris Gom. Vertical surface of cracks, mud flat, west end, Leonard 2874, Nov. 2, 1941.

Microcoleus paludosus Gom. Shallow rock pool, upper end, Leonard 2958, May 7, 1944; in low and wet ground, Drouet, Killip, & Swallen 3904, July 23, 1941, Drouet & Killip 3950, July 24, 1941.

Microcoleus rupicola (Tild.) Dr. On moist ground and mud, Drouet,

Killip, & Swallen 3920, July 23, 1941; Drouet & Killip 3959, July 24, 1941; Leonard 2880, Nov. 2, 1941; Killip 36664, 36558, July 3, 1944, Nov. 30, 1941.

Microcoleus vaginatus Gom. On alluvial ground, Drouet, Killip, & Swallen 3931, July 23, 1941; Drouet & Killip 3962 (with *Schizothrix stricklandii*), July 24, 1941; Leonard 2878 (with *Nostoc muscorum*), Nov. 2, 1941; Leonard 2951, 2969, 2970, Nov. 7, 1943, Nov. 5, 1944.

**Oscillatoria brevis* Gom. In puddle along path on mainland, Drouet & Killip 3976 (with *Symploca muralis*), July 24, 1941.

Oscillatoria curviceps Gom. In a shallow pool, Drouet, Killip, & Swallen 3927 (with *O. tenuis* var. *natans*), July 23, 1941.

Oscillatoria limosa Gom. In shallow water of the channel, Drouet, Killip, & Richards 5532, Aug. 6, 1944.

Oscillatoria princeps Gom. In pools along the river and the channel, Drouet, Killip, & Swallen 3927 (with *O. tenuis* var. *natans*), 3937, July 23, 1941; Drouet & Killip 3944, July 24, 1941; Killip 36540, 36675, Oct. 19, 1941, July 16, 1944; Drouet, Killip, & Richards 5532 (with *O. limosa*), 5557, Aug. 6, 1944.

Oscillatoria sancta Gom. In the channel at the ferry, Drouet, Killip, & Richards 4886, July 18, 1942.

Oscillatoria tenuis Gom. In shallow water, Drouet, Killip, & Swallen 3928 (with *Lyngbya putealis*), 3935, July 23, 1941.

var. *natans* Gom. In a shallow pool, Drouet, Killip, & Swallen 3927, 3937 (with *O. princeps*), July 23, 1941.

var. *tergestina* Gom. In pools, Drouet, Killip, & Swallen 3936, July 23, 1941; Drouet & Killip 3972, July 24, 1941.

Phormidium minnesotense (Tild.) Dr. On alluvial ground, Drouet, Killip, & Richards 4889, July 18, 1942.

Phormidium valderianum Gom. In shallow water of the river, Drouet & Killip 3965, July 24, 1941.

Plectonema nostocorum Gom. On mud and alluvial ground, Drouet, Killip, & Richards 4887, July 19, 1942; Leonard 2882, Nov. 2, 1941; Killip 36663, July 3, 1944.

Porphyrosiphon notarisii Gom. On low ground, Drouet & Killip 3943, 3948, July 24, 1941. Also in old field on mainland, Leonard 2470 (with *Schizothrix purpurascens*), Nov. 17, 1934.

Schizothrix purpurascens Gom. On low ground, Drouet & Killip 3948 (with *Porphyrosiphon notarisii*), July 24, 1941. Also in old field on mainland, Leonard 2470, Nov. 17, 1934.

Schizothrix stricklandii Dr. In low open ground, Drouet, Killip, & Swallen 3902, 3910, 3915, 3916, 3925, 3926, July 23, 1941; Drouet & Killip 3962, July 24, 1941.

Symploca muralis Gom. On vertical rock in river near boat landing, Leonard 2827, Nov. 6, 1938. Also in puddle along path by boathouse on mainland, Drouet & Killip 3976, July 24, 1941.

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PROCEEDINGS

OF THE

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A NEW SALAMANDER (GENUS *Ambystoma*) FROM ARIZONA

By Charles H. Lowe, Jr.

Department of Zoology, University of Arizona

The geographic and ecologic distribution of the single species of salamander in Arizona, *Ambystoma tigrinum*, remains poorly known, particularly in the southern part of the state. There is little question that natural local populations still do occur in parts of Pima, Cochise, and Graham Counties at elevations of 4500-5000 feet and above. But, to date, this amphibian is known in the extreme southern part of the state only from Santa Cruz County, and specimens are available from only one locality in this area.

This recently discovered population, in Parker Canyon, near Lochiel, Santa Cruz County, represents an unusually distinctive geographic variant of *A. tigrinum* and is described here as a new subspecies. Both larvae and completely transformed individuals are available. During 1950, when these were first collected by the author, Reed (1951) independently collected larvae at the same locality. It was correctly emphasized by Dunn (1940) that the color pattern of the transformed (metamosphosed) individual forms the only presently intelligible basis for analysis of geographic variation in this species.

Ambystoma tigrinum stebbinsi* subsp. nov.

Holotype.—Number 665, University of Arizona, Department of Zoology (C. H. Lowe, Jr. No. 3216). Collected November 4, 1950, at J. A. Jones Ranch, in Parker Canyon, southwest side of the Huachuca Mountains, ca. 5000 ft., Santa Cruz County, Arizona, by Charles H. Lowe, Jr.

Diagnosis.—An unusually uniform and distinctive race of *A. tigrinum* with completely transformed individuals characterized by a black ground color on dorsal surfaces, brown on ventral surfaces, and with numerous light golden-brown to yellowish spots of the following size and distribution characteristics: all dorsal spots are less than twice the diameter of the eye; 25-45 spots occur on the *dorsal* body surface between the extreme points of the anterior and posterior limb insertions; those along the lateral and latero-ventral surface of the body and the lateral surface of the tail are conspicuously larger than those on other surfaces, with progressively smaller spots occurring dorsad; the upper surfaces of legs and

*Named for Dr. Robert C. Stebbins, Professor of Zoology and Curator of Amphibians and Reptiles in the Museum of Vertebrate Zoology, University of California, Berkeley, a friend of many years and one who has made unusually outstanding contributions to Herpetology.

tail are with distinct spots rather than bands, bars, or marbling; 35-60 spots occur on the tail (both lateral surfaces, total); a few small golden spots (or none) occur on an otherwise immaculate belly (mid-venter); the chin is boldly spotted, lined, or blotched with golden-yellow; a conspicuous and relatively large spot usually occurs in each axilla.

Description of the holotype (colors and measurements from the fresh specimen).—Completely transformed female, snout-vent length 70.6 mm., tail length 55.2 mm., costal grooves 13/13, counting one each in avilla and groin.

The dorsal surfaces of the head, body, tail, legs, and feet are black. Ventrally and ventro-laterally the ground color is dark brown (near Beaver, Pl. 15, A 7)[1] and partially translucent at the center of the abdomen. There is a gradual gradation on the lateral surfaces from the black of the dorsum to the brown of the ventrum.

Light spots and blotches are numerous on the upper surfaces; all on the *dorsal* surface proper are smaller than twice the diameter of the eye; 34 spots occur on the *dorsal* surface of the body between the extreme limits of the anterior and posterior limb insertions. The spots on the dorsal and dorso-lateral surface of the head, body, legs, and feet are yellowish golden-brown (Pl. 13, J 6); 48 spots occur on the lateral surfaces of the tail and are approximately the same yellowish golden-brown. The spots on the lateral and ventro-lateral surfaces of the head and body are light yellow (Pl. 10, F 1). The few spots on the belly and the bold chin markings are also light yellow (near Pl. 10, F 1).

The largest light spots occur on the lateral surface of the compressed tail and on the lateral and ventro-lateral surfaces of the body. A conspicuous oval spot occurs in each axilla. There are 13 small spots on the approximate mid-dorsal line from occiput to base of tail. The belly (mid-ventrally) is immaculate except for 4 very small and inconspicuous golden spots.

Material.—In addition to the type, ten paratypes (transformed individuals) have been available and studied; these are Nos. 666-671 University of Arizona, Department of Zoology, and one each to the following: F. A. Shannon Herpetological Collection, Wickenburg, Arizona; University of California, Museum of Vertebrate Zoology, Berkeley; Chicago Natural History Museum; U. S. National Museum. Reed (1951) distributed larvae to the following: FASHC, Wickenburg, Arizona; MVZ, Berkeley; Chicago Natural History Museum.

Remarks.—The type series is relatively uniform in characteristics and the description of the type serves well for the population as now known.

The following measurements and counts refer to the type series (N =11); snout-vent length 67-74 (70.6 mm.); 29-43 (35.4) spots on the dorsal body surface between the extreme points of the anterior and posterior limb insertions; 31-57 (43.8) spots on the tail (both lateral surfaces, total). The holotype is close to or at the means of these characteristics for the hypodigm; it has 34 spots on the dorsum, 48 on the tail, and has a snout-vent length of 70.6 mm.

The shape, size, and distribution of the light spots of *A. t. stebbinsi*

[1]Color determinations (Pl., etc.) from Maerz and Paul, "A Dictionary of Color," McGraw-Hill Co., 1930.

are sharply distinct from the spotting, blotching, or marbling of *A. t. nebulosum*, *A. t. mavortium*, *A. t. californiense*, and *A. t. velasci;* it is somewhat less distinct from the most geographically distant *A. t. tigrinum*. This race (*stebbinsi*) differs from the others in 100% of the series now available.

The grown larvae of the races of *Ambystoma tigrinum* are more or less uniform dark greenish on upper surfaces and lighter colored below. In *A. t. stebbinsi* the colors are as follows: dorsal surfaces slaty green (Pl. 24, C 1); lateral surfaces dark green (Pl. 24, J 1); ventrally, body very light yellow (Pl. 17, C 1), head somewhat darker.

The change in color pattern is gradual. Spots appear first on the lateral surfaces of the tail. As golden spots develop on the tail, similar ones begin to appear on the body. Concomitant with development of the golden spots there is a progressive change of ground color from greenish to blackish.

The largest larva available has a snout-vent of ca. 55 mm.

Distribution.—A. t. stebbinsi is known only from the type locality in Parker Canyon, approximately 3.5 miles north of the Mexican border, Santa Cruz County, Arizona. The habitat is in open Oak-Grassland at ca. 5000 ft. The small pond is semi-permanent, with relatively clear water, a mucky bottom, and a maximum depth of 5-6 feet.

Parker Canyon drains southward into the San Rafael Valley and the upper reaches of the Santa Cruz River, both of which are crossed by the International boundary in the vicinity of Lochiel, Arizona. This race is to be expected in Sonora and in adjacent parts of southern Arizona and southwestern New Mexico, areas which remain inadequately explored for ambystomids.

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PROCEEDINGS

OF THE

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A NEW RACER (GENUS *Masticophis*) FROM ARIZONA AND SONORA, MEXICO

By Charles H. Lowe, Jr., and William H. Woodin, III

Department of Zoology, University of Arizona, and Arizona-Sonora Desert Museum

During 1951, Mr. A. W. Ruff of Cananea, Sonora, Mexico, made a collection of living and preserved reptiles which he kindly presented to the University of Arizona. Included were two living adult red racers (*Masticophis flagellum*) which represent an unusually distinctive geographic variant in this widespread polytypic species. These are from a herpetofaunally little known area of eastern Sonora. Three additional specimens from extreme southern Arizona, in the private collection of the junior author, belong to this form described here as a new subspecies.

Masticophis flagellum cingulum subsp. nov.

Holotype.—No. 672, University of Arizona, Department of Zoology. Collected at Moctezuma, ca. 2000 ft., Sonora, Mexico, 1951, by A. W. Ruff.

Diagnosis.—Characterized by adult dark red-brown ground color on upper surfaces periodically broken by complete transverse, narrow, light-colored (pink) cross-bands which break the ground color into large, dark, longitudinally oblong sections; the cross-bands are doubled (or paired) posteriorly; a single outstanding light band crossing the nape.

Description of the holotype (measurements and color in life).—Adult female, snout-vent length, 1023 mm.; tail length (tip missing), 209 mm.; head length, 39.6 mm., contained 25.8 times in snout-vent length; head width, 19.4 mm.; ratio head length to head width, 2.04.

Scale rows, 21-17-13, with 6 at middle of tail. Ventrals, 193; subcaudals, 85 (incomplete), all divided. Anal divided. Supralabials, 8-8; infralabials, 8-9. First infralabials undivided. A mental. Chin shields normal. Internasals, prefrontals, frontal, and supraoculars normal. Parietals restricted (pointed) posteriorly. Nasals, 2-2; loreals, 1-1; preoculars, 2-2; postoculars, 2-2.

Mid-dorsally the dark brown ground color tends to be blackish brown, grading to dark reddish brown (near Pl. 7, J 12)[1] dorso-laterally and

[1]Maerz and Paul (1930) color determinations. In Maerz and Paul the dark browns are particularly difficult to match.

to lighter reddish brown (near Pl. 7, J 7) laterally. Each dorsal scale tends to be darker on its posterior portion. On the anterior body, only a few scales are edged with pink (on anterior portion of scale); there is a progressive increase posteriad in amount of pink per scale. Thus pink predominates on the posterior body and tail and the darker brown is there restricted to the posterior edges of each scale.

The upper surfaces of the head are reddish brown, distinctly darker on the supraoculars and with faint light edges to the scales. There are conspicuous pink, (Pl. 2, J 9) marks (light areas) on the labials, postoculars, preoculars, nasals, and loreal. The pink of the postnasal, loreal, and preocular is continuous and forms a "loreal stripe" from orbit to naris. Under surfaces of the head are variously colored cream and pink with small dark brown and black spots and blotches.

The ventral surface of the neck is dark pink (Pl. 2, J 9) being approximately the same color as the undersurface of the tail and of the gular area. The ventral surface at mid-body is a lighter pink (Pl. 2, G 8) than the neck and tail venters. The dark pink venter of the tail is near Pl. 2, J 8. The entire ventral surface is patterned by bold brown transverse cross lines adhering to the posterior margins of the ventral scutes and extending completely across them. These are commonly associated with brown blotches on the lateral margins of the scutes. In addition to the dark transverse lines on the neck, there are the commonly observed (in *M. flagellum*) bilateral rows of dark blotches and spots on neck and gular region gradually fading away posteriorly.

On the upper surfaces, there is a series of conspicuous light-colored transverse, narrow bands or cross-bars which extend completely across the lateral and dorsal surfaces of the neck and body. Their effect is to break up the dark ground color of the upper surfaces into several large, longitudinally oblong sections. The first of these bands is approximately four scales posterior to the parietal head plates (counting scales along the vertebral line). This anterior-most band is the narrowest and most sharply defined and is approximately one and a half scales in width. The second pink band is somewhat wider, being approximately two scales in width, and, like the remainder, is less sharply delimited along its edges than is the first. The second band is approximately 12 scales posterior to the first. The third, fourth, and fifth bands are simple single transverse bands approximately like the second. The next and last three bands or band areas (sixth, seventh, and eighth) are actually narrow double bands of pink separated by a similar narrow band of dark brown ground color. The sixth band area (double band of pink) begins approximately 75 scales posterior to the head (parietals). It is separated from the seventh band area by approximately 18 scales; the seventh is similarly separated from the eighth by approximately 17 scales. There appears to be a faint trace of a ninth band area on the posterior body half where the ground color gradually becomes the uniform braided pattern of the tail.

There is a faint, barely perceptible trace of a light longitudinal light line (pink) on the anterior body involving the first two scale rows. On the posterior body area, the lower scale row gradually becomes predominantly pink, taking on the color of the adjacent scutes. This is concomitant with the gradation posteriorly into a "uniform" braided whiplike pattern of light pink and brown. On the neck are traces of

additional pink "bands" which give a clue to a probably more banded neck in hatchlings and juveniles as is commonly seen in members of the *flagellum* complex. These traces are lacking in the larger, older paratype from the type locality.

Material.—Four paratypes are as follows: UA No. 673, Moctezuma, ca. 2000 ft., Sonora, Mexico; WHW No. 491,[2] 4.3 miles E. Amado, Santa Cruz County, Arizona; WHW No. 539, 2.3 miles (by rd.) S. Amado, on Nogales Hwy. (U.S. 89), Santa Cruz County; WHW No. 640, 6.1 miles (by rd.) S. Arivaca, Pima County, Arizona.

Variation.—The paratype (UA 673) from the type locality is a larger and more mature specimen than the type, with which it agrees in all important characteristics, and is with even clearer banding. Its transverse pink bands are as follows: The first band is typically sharply delimited from the ground color it separates, is approximately two scales in width and is approximately two scales posterior to the temporals. The second transverse band is slightly wider than the first and is less sharply delimited from the ground color. The difference in clarity and width of the first band from the remainder appears to be consistent. The third band is similar to the second. The fourth band is slightly wider than those anterior and is somewhat separated into two narrow bands, thus anticipating the additional racial characteristic (as seen in the fifth, sixth, seventh, and eighth bands of this specimen) in having the posteriormost band areas consisting of doubled or paired pink bands separated by a brown ground color band of similar narrow width. Beyond the eighth there is a slight trace of a ninth band area, as in the type, where in this posterior body section the color pattern of upper surfaces gradually becomes a braided whip pattern of contrasting light pink and brown. This larger specimen lacks the additional faint traces of light bands on the neck which are seen in the type.

In the two additional paratypes from near Amado, Arizona, the paired bands were less pink (more cream color) in life. The paratype from Arivaca, Arizona, shows intergradient tendencies towards *M. f. piceus* in its less prominent body bands.

The light pink to cream transverse banding of the race is more apparent in life than in preserved specimens where the bands naturally tend to become less well defined when the pink fades completely and the melanins become reduced in intensity. It should be understood that the cross-banding of the body of *cingulum* is totally unlike the common banding characteristic of the species which is usually seen best developed on the neck and anterior body. In *cingulum*, the dorsal head scales are but barely light edged and not all edges are involved. All dorsal body scales are entirely lacking a central, longitudinal streak or spot found in other races.

Ventral and caudal scale counts for the available specimens are given in Table 1.

Range.—The known range of *M. f. cingulum* is Moctezuma, Sonora, Mexico, northward to Amado, Santa Cruz County, Arizona. While Amado approximates its actual northern limit, its southern and east-west limits are unknown. However, this race appears to be a form of the upper edge of the Sonoran Desert in the scrub and grass ecotone between Desert Grassland and Desert.

[2]Private collection of William H Woodin, Tucson, Arizona.

The general Tucson area of southern Arizona is a yet confusing area of gene exchange between (1) the *black* phase of *M. f. piceus*, (2) the *red* phase of *M. f. piceus* (the two producing several varicolored phases between the black and red extremes), and (3) *M. f. cingulum*. Characters of the latter may occasionally appear in intergrades (= hybrids) of the other two. A living specimen from ten miles southeast of Robles Ranch 3-point Junction (vicinity of Tucson), Pima County, Arizona, is a nearly completely red snake with a few scattered jet black scales dorsally, and clear traces of the double banding of *M. f. cingulum*. Paratype WHW No. 491 shows what may also be *piceus* color in its occasional dark spots occurring on head and body. Preserved material from Cochise County of extreme southeastern Arizona appears to be intergradient between *M. f. cingulum* and *M. f. flavigularis*.

TABLE 1

Ventral and caudal scale counts of *Masticophis flagellum cingulum*

	Sex	Ventrals	Caudals
Type			
UA 672	♀	193	85 (incomplete)
Paratypes			
UA 673	♂	199	113
WHW 491	♀	201	45 (incomplete)
WHW 539	♂	200	104
WHW 640	♂	199	101

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PROCEEDINGS

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DESCRIPTIONS AND NOTES ON SOME SPECIES OF *CINARA* (APHIDAE)

F. C. Hottes

I would acknowledge the assistance afforded me by a colony of small odoriferous, very pugnacious Ants whose members led me to two of the species described herewith, and who kept me very busy while taking them.

Cinara puerca new species

Apterous viviparous female.

Size and general color.—Length of cleared specimens from vertex to end of anal plate varying from 3.00-4.36 mm. Most specimens are 3.57 mm or more in length. Width of head through eyes .86 mm. Head dark brownish black, thorax and abdomen the same. Dorsum of abdomen at times with a narrow pale brownish median stripe. Ventral and lateral surfaces of body light brown with more or less of a reddish tinge. Entire body highly polished and free from all indications of powder. First antennal segment black, remaining antennal segments dark dusky, with apical portions of third, fourth, fifth and all of sixth darker. Femora blackish-brown, tibiae the same with proximal and apical regions darker. Tarsi black. Cornicles black, not as highly polished as rest of abdomen. Cleared specimens show the median suture of the head pale, this is continued on the prothorax and becomes a wide irregular pale area on the mesothorax.

Head and thorax.—Anterior margin of head broadly rounded, often indented in region of median suture. Region of head where antennae are attached deeply excavated, pale, much larger than base of antennae. Eyes small, ocular tubercles present but small, and at times difficult to see. Eyes set close to head, without stalks, and not extending beyond sides of thorax. Vertex and anterior margin of head with numerous hairs, of a length about equal to those found on the antennae. Area of head median to antennae free from hair, posterior to antennae the hair shorten greatly, so they are no longer than the pigmented ring which surrounds the pale area about their base. Dorsum of thorax and abdomen with hair similar to the short hair on the posterior region of head. On the abdomen these short hairs are arranged more or less in the form of rather wide transverse bands, when viewed from directly above these hairs look like a dot within the clear area surrounded by the pigmented ring, to see these hair well they must be viewed from the side. Hair of the ventral and lateral surfaces of the body normal. Apical half of the first antennal segment and the whole of the second antennal segment with numerous hairs.

Length of antennal segments as follows; III .40-.44 mm., IV .143 mm,

V .21-.24 mm.; VI .157 + .014 -.028 mm. Sensoria distributed as follows. III primary sensorium present, no secondary sensoria, IV primary sensorium present, one secondary, V condition similar to IV. The secondary sensoria are small. All antennal segments with numerous fine upstanding hair, slightly shorter than the width of segment. Rostrum variable as to length, in very young, much longer than body, in immature as long as or longer than body, in mature specimens the rostum as a rule reaches beyond the base of the cornicles, however some specimens have the rostum longer than the body. Last three segments of the rostrum with the following lengths: .43-.50, .50-.57, .1-.12 mm. It will be noted that the third and fourth segments are unusually long for these segments, in comparison with the lengths of the third and fourth antennal segments. [Some specimens of this species show an interesting condition of the rostrum, which I have never seen before, and to which I can find no reference in my library. The first segment of the rostrum has the integument quite thin, translucent, and of a uniform color, the second segment of the rostrum is pale with dark spots, the remaining segments are black. One specimen shows the second segment of the rostrum partly telescoped within the first. This is clearly indicated by the spotted nature of the second segment. Other specimens show the second segment completely telescoped within the first, the first segment appearing as a sheath over the second, and the two segments completely recessed within the adbomen, extending posteriorly as far as the metathoracic coxae. Specimens with the rostrum in this condition carry segments three, four and five directly forward. This condition was first noted in freshly killed alcoholic material, collected on a branch. Two slides, both indicated as paratypes, showing this condition have been deposited in the United States National Museum.] Mesosternal tubercle absent. Hind tibiae short, varying in length from 1.57-1.71 mm. slightly enlarged at the apex, provided with numerous fine upstanding hairs, which are shorter than the width of segment. First tarsal segment .1 mm. in length, ventral surface with about twenty hairs, this segment is rather thick. The second tarsal segment is from .24-.27 mm. in length, it also is rather thick, hairs on ventral surface much more numerous, but just as long as those on the dorsal surface. Claws not sharply pointed.

Abdomen.—Cornicles with outer margin very irregular and varying from .35-.43 mm. across, provided with a few hairs, which are fairly long and fine, the hairs being scarce near the margin. Only the posterior portion of cauda pigmented, and provided with long fine hairs. Transverse pigmented area anterior to cauda divided or almost so, large, block-shaped, with one or two rows of long fine hairs near posterior margin.

Holotype apterous viviparous female, deposited in the United States National Museum. Hosts *Pinus edulis*. Taken in Colorado National Monument (Head Quarters Area) Fruita, Colorado, July 2, 1954.

This species may be taken on the trunk and larger limbs of mature trees. On the trunk the specimens live in the deep fissures between the thick plats of bark. In such troughs, more or less grown over, one, two, or three specimens may be taken. From such cramped areas, the highly inflated specimens can be removed with difficulty. During this process the body very often bursts, producing a sound which is just audible, adults make no effort to get away, but hang by their rostrums, which are often left behind.

On the branches specimens occur in small colonies, on rough but thinner areas of bark. In such locations the colony is sheltered by a "roof" constructed by ants. While I was attempting to photograph such a colony, I noted that the specimens started to move away as soon as the "roof" protecting them was removed, although the specimens themselves had not been touched. Recalling their small eyes, it was suspected that the specimens were negatively phototropic. This was proven. This reaction also explains why I could never again locate specimens, I had partially exposed by carving away portions of the roof and margins over deep fissures of trunk bark. Having made this discovery, I have been able to rear additional specimens on the bark of a branch of my selection placed in water. The "roof" I provided was made of aluminum foil.

In Palmer's key to the genus *Cinara* in "Aphids of the Rocky Mountain Region" this species keys to couplet seven. The fourth segment is too long for that of *glabra*. *C. puerca* may be keyed to *C. tanneri* K. in Palmer's book if one disregards the statement relative to short hair on abdomen. Dr. Knowlton has kindly made the type of his *C. tanneri* available to me for study. There is no question that the two species are close allies. *C. puerca* differs from *C. tanneri* in the longer third and fourth segments of the rostrum, both being longer than the third antennal segment, the fourth segment being three or more times as long as the fourth antennal segment, not twice. The first and second antennal segments have many more hairs, remaining antennal segments with two or more times the number of hairs, by actual count, than those on the antennae of *tanneri*. The cornicles have a much larger base, as well as more hairs. The hair on the tibiae are far more numerous, and the same holds for the hair on the ventral plate. The type of *tanneri* is cleared, it also has the short hair on the posterior portion of the head, thorax and abdomen. On the abdomen these do not seem to be as numerous as in *puerca*, nor do they seem to be in bands. They may not be the only type of hair on the dorsum. Knowltons "type" material consists of the type slide and a paratype slide. On the type slide there is one mature apterous *tanneri* and one alate, described as *tanneri* but which is actually *C. edulis* (W). The paratype slide contains one immature *tanneri* and one *edulis*, both apterous.

Stripped of its slide associates, there is nothing in the appearance of *tanneri* to suggest *C. edulis* (W). It has the same, small close fitting eyes of *puerca*, the same short hairs on the dorsum of head, thorax and abdomen, the same short thick tarsi, short tibiae and thickened antennae. I am not sure that either *tanneri* or *puerca* are correctly placed in the *Cinara*. *C. puerca* especially has a somewhat "foreign" look especially in the form of the head, the small eyes, the short thick antennae tibiae and tarsi.

Cinara nimbata new species

Apterous viviparous female.

Size and general color.—Length from vertex to end of anal plate of cleared specimens 3.76-4.22 mm. Head and thorax black, made distinctly gray, by pulverulence. Abdomen gray-green on dorsum and sides, but the sides and more lateral portions of the dorsum are often a light cinnamon-brown. Dorsum of abdomen with two rather indistinct darker stripes which merge and have their origin on the thorax, these do not show on cleared specimens and are most likely not due to pigment in the chitin.

Entire dorsum of abdomen irregularly covered with powder, except for the cornicles which are black and shining. Head, thorax and abdomen provided with many long blackish hairs, which extend well beyond the powder of the body, the amount and placement of the powder, and the blackish hairs give the insect a rather unkept appearance. First and second antennal segments black, or almost so, third antennal segment yellowish with more or less dusky, apex of segment dusky, fourth segment dusky except near base, fifth segment similar to fourth, sixth segment dusky, but much darker towards apex. Femora mottled more or less, with brownish black predominating over yellow, the yellow being present near base and beyond middle. Tibiae with base black, this area is followed by a region in which yellow is the base color, this region is given a peculiar mottled appearance by the fact that the blackish hairs arise from dusky brownish areas which extend some distance from the base of the hairs, and sometimes join other such pigmented areas, thus producing a striped or blotched effect, on the yellow base. This region extends slightly beyond the middle, and is followed by a black region which is carried on to the tarsi. Pigmented areas anterior to cauda, wide and block-like, these carrying hairs which at times extend well towards the middle, the hairs not being arranged in rows.

Head and thorax.—Median suture of head very dark. Anterior margin of head very much arched, it and dorsum with many heavy hairs which are about .1 mm. in length, these hairs as well as the other body and appendage hairs are deeply pigmented. Hair on first antennal segment confined largely to one or two irregular rows near apex, hair on second segment scattered but more numerous on anterior margin. Length of antennal segments as follows: III .46-.53 mm., IV .20-.24 mm., V .26-.30 mm., VI .17-.20 + .03 — .04 mm. Sensoria distributed as follows: III with neither primary or secondary sensoria, IV same as III, V with primary and one secondary sensorium. Hair on antennae set at an angle of about forty-five degrees, hair on anterior margin more abundant than that on posterior margin, about .13 mm. in length, longer than that on posterior margin. Rostrum with segments four and five extending beyond metathoracic coxae. Last three segments of rostrum with following lengths: .26, .23, .13 mm. Mesosternal tubercle absent. Hind femora 1.57-1.71 mm. in length, strongly developed. Hind tibiae 2.79-3.00 mm. in length. Hair on hind tibiae numerous set at an angle of forty-five degrees or more. Hair on middle portion of tibiae distinctly longer than that near base being about .114 mm. in length. The hairs near the apex of the segment are slightly longer than this. Hair on inner and outer margins about the same as to length and quality, except for the hairs near the extreme apex on the inner side where they are very much shorter, and finer in quality. First segment of hind tarsis with about eight hairs on the ventral surface, this segment is about .11 mm. in length. The second segment of the hind tarsis is from .41-.42 mm. in length, this segment joins the first rather broadly, the union being about equal to the width of segment.

Abdomen.—Abdomen with many hairs, the hairs on the ventral surface more numerous, finer in quality and not so black, as those on the dorsum, but of about the same length. 1 mm. Cornicles with base very irregular and from .54-.60 mm. across, often with clear areas near margin. Opening of a cornicles acentric, closer to posterior margin. Cornicles provided with two kinds of hairs a longer somewhat coarser type confined roughly

to regions near margin and to origin of more constricted area, and a finer shorter type confined largely to the constricted area, the two types being intermixed at the jone of junction. Hair on cauda confined largely to pigmented posterior pigmented region. Surface of both cauda and anal plate setulose.

Alate viviparous female.

Size and general color.—Color quite similar to that of apterous viviparous female except that most of the specimens have more brown on the lateral surfaces of the abdomen, and that the median posterior lobe of the thorax which is highly developed is white due to heavy pulverulence. The ventor of only one specimen had a spot of powder, in this respect is quite similar to that of the apterous forms. Length from vertex to end of anal plate 3.86-4.86 mm. Length of antennal segments as follows: III .54-.60 mm., IV .21-.29 mm., V .33-.35 mm., VI .21-.25 + .04 mm. Secondary sensoria distributed as follows: III none, on this segment the primary sensorium is lacking as often as it is present, IV none, primary sensorium present, V one, primary sensorium present. Lateral and median posterior lobes of thorax with numerous hairs over the entire surface. Media once forked, very poorly indicated, and not visible at all before fork. Stigma very dark, with a scale-like surface, provided with a few scattered hairs. Cell formed by radial sector dark, radial sector and cubitus black, bordered with brownish. Anal vein dark brown bordered with large brownish area which extends well towards the cubitus and origin of wing. Hind femora 1.93 mm. in length. Hind tibiae 3.00-3.29 mm. in length. Hind tarsi .14 +.43-.45 mm. Cornicles .60-.64 mm. Features not mentioned similar to those found on apterous viviparous female.

Alate male.

Described from two specimens, both reared, and taken about twelve hours after becoming adult, perhaps too soon for them to have acquired fully the characteristics of the adult. Length 2.64 mm. Head and thorax dark dusky, abdomen blackish-brown, mottled more or less with irregular placed patches of powder. Legs and antennae much paler than similar structures of the viviparous females, much less yellow, tibiae not so conspicuously mottled, hair on antennae and legs paler, finer, and slightly longer than in viviparous females. Antennal segments with the following lengths: III .51-.54 mm., IV .26-.27 mm., V .30 mm., VI .23 + ..02 mm. Sensoria distributed as follows: III 75-83, very small, very tuberculate, so numerous that counting is difficult. Antennal hair longer, finer and much less numerous than hair on viviparous female, perhaps reduced in number by lack of room, due to large numbers of secondary sensoria, which reduce surface available to them. IV 14-21, V 15-18, VI 12. Presence of primary sensoria on third and fourth antennal segments questionable, if present much like secondary. Primary sensorium on fifth segment large. Length of hind tibiae 1.93 mm. Hind tarsal segments with the following lengths: .08-.1, .35-.38 mm. Cornicles .33-.35 mm. across base, width of head across eyes. .66 mm. Wings with similar pigmented areas as found in viviparous females. Harpagons long finger-like, slightly curved, provided with numerous hairs.

Oviparous female.

Length from vertex to end of anal plate 3.79 mm. Color not observed in life. Antennal segments with the following lengths: III .46 mm.,

IV .18 mm., V .24 mm., VI .18 + .03 mm. Sensoria distributed as follows: III none, IV none, V one secondary and primary. Width of head through eyes .74 mm. Hind tibiae 1.93 mm. Hind tarsi .08 + .37 mm. Pro and mesothoracic femora and tibiae much like those of apterous viviparous female in color, but hair are not so dark, finer, and slightly longer. Metathoracic femora dusky, with basal and apical regions lighter and darker. Hair on hind tibiae finer than that of viviparous females. Hind tibiae thickly provided with sensoria except near base and apex.

Holotype alate viviparous female, morphotype apterous viviparous female, morphotype oviparous female, allotype alate male, all deposited in the United States National Museum. Host *Picea engelmanni,* taken Aug. 3, 1954, Aug. 3, 1954, September 10, 1954 and Sept. 10, 1954. All specimens were taken at an altitude of about 11,000 feet along the trail to Cottonwood Lake, Grand Mesa National Forest, Skyway, Colorado. This species does not live in colonies, and is to be taken one or two at a time, at the rate of eight to ten specimens per hour. It is not attended by ants. Specimens because of their almost perfect protective coloration are extremely difficult to locate, and are best taken in a net. Specimens seem to have a preference for short, stubby, dense, shelf-like branches close to the trunk of the tree.

This species may be keyed in part, and with reservations, to *C. osborni* K. in Palmer's key to the genus Cinara in "Aphids of the Rocky Mountain Region." From *osborni* it can be distinguished at once by the fact that the cornicles do not arise from the deeply pigmented lateral area of the abdomen, the longer darker hair, and darker color. It is perhaps most closely allied to *C. costata* (Z). *C. nimbata* is a larger species, the hair on the antennae and legs is shorter, coarser and darker, the antennae and legs are longer, the pigment in the wings more intense.

Cinara nitidula new species

Apterous viviparous female.

Size and general color.—Cleared specimens vary in length from 2.02-2.29 mm. Head dusky brown, very lightly covered with powder. Thorax light brown with a few darker pigmented areas, these are also brown. Abdomen various shades of brown with a few dark brown very small spots. Thorax and abdomen free from all powder and highly polished, except for sides of thorax which may have slight amounts of powder. Antennal segments one, two, three and four light yellowish, fifth and sixth segments yellowish at base and dusky at the apex. Femora pale at base with apical halves dusky brown. Tibiae with knees dusky, followed by a pale region which shades to dusky brown beyond middle. Tarsi dusky. Cornicles dark brown, shining, very highly polished.

Head and thorax.—Width of head through the eyes .54-.57 mm. Length of antennal segments as follows: III .29-.30 mm., IV .1-.14 mm., V .13-.15 mm., VI .08 +.04 mm. The third antennal segment without either secondary or primary sensoria. Fourth antennal segment like the third, fifth antennal segment with primary sensorium and one secondary. Hair on third antennal segment sparce, spine-like, set at an angle of about forty-five degrees, or more subequal to width of segment in length. More deeply pigmented portions of segments five and six imbricated. Rostrum variable in length, varying from the metathoracic coxae to nearly the end of the abdomen. Last there segments of rostrum with the following

lengths: .21, .17, .07 mm. Ocular tubercles well developed. Anterior margin of head highly arched. Hair on dorsum of head slightly longer than hair on third antennal segment, and more spine-like. On the thorax the hairs on the dorsum are shorter than those on the head, on the dorsum of the abdomen the hairs are still shorter. Hind tibiae 1.35-1.50 in length. Hairs on hind tibiae rather sparce, about equal to width of segment in length, or subequal, rather upstanding, those on outer margin more upstanding than those on inner margin and also slightly longer. First segment of hind tarsis about .08 mm. in length. ventral surface with about eight hairs. Second segment on hind tarsis .18-.21 mm. in length.

Abdomen.—Hair on dorsum of abdomen varying from slightly less than .02-.028 mm. rather sparce. Hair on ventral surface much more numerous, and quite long. Cornicles with base varying from .34-.40 mm. provided with a few hairs, which measure about .07 mm. in length, these hairs are more numerous on the neck region and are almost absent near the outer margin. Hairs on the ventral plate sparce. Anal plate and cauda normal. Transverse pigmented area anterior to the cauda divided, posterior region with about two rows of long spine-like hairs.

Alate viviparous female.

This form in general appearance and color is much like that of the apterous viviparous female, and like the apterous form is free from all powder on the dorsum of the thorax and abdomen. Length from vertex to end of anal plate 1.79-1.91 mm. Antennal segments with the following lengths: III .29-.30, IV .11-.13 mm., V .16-.17 mm, VI .08 + .03 mm. Secondary sensoria distributed as follows: III, 0-4, there are neither primary or secondary sensoria on the fourth segment, V, 1. Hind tibiae 1.22-1.43 mm. Hind tarsi .07 + .18-.21 mm. The hair on the hind tibiae are longer than the hair on the apterous viviparous female, the ratio of length to width being five to three, the hairs near the base of the tibiae are more upstanding than those near the apex. The hairs near the apex are no longer than those near the middle. Base of cornicles varying from .29-.31 mm. Width of head through the eyes .51 mm. Hair on lateral lobes of thorax confined largely to central portions of lobes and not numerous. Media with two brances, the second branch closer to margin of wing than to the first.

Holotype, alate viviparous female, morphotype apterous viviparous female. Both types deposited in the United States National Museum. Both reared in Grand Junction, Colorado from material taken in Colorado National Monument, (Headquarters Area) Fruita, Colorado. Host *Pinus edulis*. Specimens killed July 20, 1954 Specimens of this species may be taken on terminal twigs, and regions just below, in among the yellowish scales, beneath which the young and adults commonly poke their heads in feeding. This species may be keyed in Palmer's key to the genus *Cinara* in "Aphids of the Rocky Mountain Region" to *Cinara atra* (G & P), but not without question, because the hairs on the dorsum of the abdomen are slightly too long. It may be distinguished at once from *atra* by the length of the hair on the ventral surface of the first segment of the tarsis, being no longer than the width. In *atra* these hairs are much longer and as a rule curved at the end. *C. atra* also has fewer hairs on the cornicles, and a much darker color, and the hair on the tibiae increase in length towards the apex, and become more droopy. If one continues Palmer's key, the species may be keyed to *C. terminalis* (G & P) to which it is

closely allied. From *terminalis, nitidula* differs as follows: there is no powder on the dorsum of thorax and abdomen, the specimens live in colonies, the apterous forms have no sensoria on the third and fourth antennal segments and the alate none on the fourth. The hind tarsi are shorter, and the rostrum may be. The hair on the tibiae of the alate are shorter, and less upstanding. There are no sensoria on the fourth antennal segment of the alate. The hairs on the tibiae of the apterous form never reach the length of the hairs on the tibiae of the apterous form of terminalis, and are less upstanding. In *terminalis* the transverse pigmented spots anterior to the cauda are hardly more than a stripe, in *nitidula* these spots are much wider.

Cinara fornacula Hottes

Alate viviparous female.

Size and general color.—Length from vertex to end of anal plate varying from 2.71-3.21 mm. Head yellowish-brown with darker brown about ocelli and stalks of eyes. Median suture pale brown, not much darker than head. First antennal segment concolorous with head, the second segment is yellow, the third segment is yellowish at the base and becomes dusky towards the apex, fourth, fifth and sixth antennal segments progressively more and more dusky. Thoracic lobes brownish bordered with yellow. Abdomen pea-green, as a rule free from powder, but at times with a slight bloom such as one might find on a plum. Cornicles concolorous with abdomen, very difficult to differentiate from abdomen about base, therefore difficult to measure at this point. Femora more or less yellow, with apical regions darker. Tibiae yellowish becoming dusky near apex. Tarsi dusky to almost black.

Head and thorax.—Antennal segments with the following lengths: III .35-48 mm., IV .20-.21 mm., V .26-.29 mm., VI .13-.17 + .03-.04 mm. Secondary sensoria distributed as follows: III 2-3, IV 0-2 as a rule two, V 1-2 as a rule one. On the third segment the sensoria are arranged in a straight row near the end of the segment. Antennal hair not numerous, set at an angle of about forty-five degrees and about .07 mm. in length. Hair on anterior margin of head about as long as that on third antennal segment. Ocular tubercles well developed as are the eye stalks. Hair on either side of the median suture arranged in a single row, there are no hair immediately adjacent to these. Rostrum reaching just beyond metathoracic coxae, last three segments with the following lengths: .24, .23, .08 mm. Media twice forked, second fork closer to margin of wing than to first, both branches very faint. Surface of wings very lightly fuscous. Metathoracic tibiae 1.85-2.02 mm. in length. Hair on tibiae set at an angle of about sixty degrees, about .14 mm. in length, longer than in the case of the apterous viviparous female. Hair on outer margin of tibiae more spine-like also more upstanding than hair on inner margin. First segment of metatarsis with about twenty hairs, the hair not being limited to the ventral surface, this segment is about .1-.13 mm. in length, the second segment is from .44-.47 mm. in length, the hair on the dorsal surface of this segment are longer and less numerous than the hair on the ventral surface.

Abdomen.—Cornicles with base about .17-.21 mm. but exact size is very difficult to determine, provided with many long fine hairs. Surface of abdomen with numerous fine long hair. Dorsum of abdomen with four

rows of small pale wax pore plates. Pigmented area anterior to cauda difficult to differentiate as such, pale, as a rule more or less fragmented. Cauda with both long and short hair.

Morphotype alate viviparous female, deposited in the United States National Museum. Taken on *Picea engelmanni* July 15, 1954, South of Glade Park, Colorado.

This species is closely allied to *C. pilicornis* (Hartig) and from which it differs as follows; never taken in colonies, but always as single individuals, viviparous females with no pulverulence, cornicles concolorous with abdomen, larger, hair on antennae and legs shorter, males have many more secondary sensoria on the antennae. The type of this species was given to Prof. O. W. Oestlund, whose collection is now in the Entomology Department of the University of Minnesota. I have not been able to locate it there. I have one specimen of the original material in my collection, which I am placing in the United States National Museum, it is indicated as a paratype. Specimens of this species are always scarce, and most difficult to locate. It has taken me years of searching to locate the few alates described herewith. The paratype specimen from my collection was sent Dr. Börner, he did not know it, and said it was not the *viridescens* of Cholodkovsky, as I had already questioned from the original description.

Cinara lasiocarpae (Gillette and Palmer)

Alate viviparous female.

Size and general color.—Length from vertex to end of anal plate varying from 3.86-4.15 mm. Color much darker than that of apterous viviparous female. Head and thorax blackish-brown. Abdomen with a mottled appearance due to irregular distribution of powder over a dark brownish-black. First and second antennal segments with about same color as head, third, fourth, fifth and sixth segments dusky with apical portions darker. Median suture of head black, with two short blackish stripes on either side. Most of surface of wings smokey. Femora with apical half dusky-black, proximal portion of femora paler. Tibiae subject to variation as to amount of black, proximal region black, this region is followed by a region which is light dusky, and quite variable as to extent and duskiness apex of tibiae black. Tarsi black.

Head and thorax.—Ocular tubercles present and well developed. Length of antennal segments as follows: III .74-.86 mm., IV .27-.35 mm., V .34-.43 mm., VI .20-.24 + .06 mm. Secondary sensoria distributed as follows: III 1-7, IV 1-8, V 1-3. The unguis is long and nail-like. On the third segment the sensoria are arranged in a row. Hair on antennae as in apterous viviparous females, abundant, set at an angle of about forty-five degrees, and from .14-.17 mm. in length. Last three segments of the rostrum with the following lengths: .30, .28, .11 mm. Lateral and posterior lobes of thorax with numerous long fine hair, which are uniformly distributed over the surface. Media twice forked, the second fork closer to the margin of the wing than to the first.

Abdomen.—Cornicles about .43 mm. across base which is very irregular, the cornicles are rather high and provided with two kinds of hair as to quality and length, the longest hair being two times the length of the shortest. This condition is also true of the apterous viviparous

females, hence cleared specimens of this species can not be keyed in Palmer's key if this condition is noted. Apterous specimens of this species taken on Piñon Mesa, South of Glade Park have the tibiae lighter in color than similar specimens taken of Grand Mesa, where I have followed this species for years in the attempt to collect the alate form.

Specimens of this species are allied to *C. abieticola* (Chol.) but they are smaller, have the legs paler, the tibiae have fewer, shorter, more droopy hair, about the same statement will hold for the antennae of the two species. There is much that we do not know about the life history of this species. I have investigated it for years. The stem mothers produce large numbers of offspring, which in turn remain associated with her and add to the size of the colony, preferably produced on the trunk of a young tree, and larger limbs of older trees. Specimens remain in these large colonies till shortly after the middle of July in most years, then in a matter of three or four days the specimens disperse, leaving only the badly stained honey dew areas to mark their former homes. They migrate to the smaller branches, and locate in small groups of four or five, and it was in such, that I by chance located a total of eight alate specimens after years of looking for them. In most seasons by mid August I have completely lost all trace of them, only to recover oviparous females the last of August or mid September.

Cinara engelmanniensis (G & P)

Alate viviparous female.

Size and general color.—Length from vertex to end of anal plate varying from 2.50-2.79 mm. Color same as apterous viviparous females and like them with two rows of dark brownish irregular shaped pigmented areas on the dorsum of the abdomen, whose general color is a pale yellow. Head thorax and abdomen lightly pulverulent.

Head and thorax.—Antennal segments with the following lengths: III .24-.53 mm. as a rule about .35 mm., IV .13-.16 mm., V .17-.20 mm., VI .17 + .03 mm. It is most unusual but neither the third nor fourth antennal segments have primary or secondary sensoria. The fifth antennal segment has no secondary sensoria but the primary sensoria is present. Hair on antennae and legs as in the apterous viviparous female. Lateral thoracic lobes of thorax with hair over entire surface. Ocular tubercles present, but small and difficult to see in most cases. Stigma smokey, cell formed by radial sector cloudy. Media once branched. Transverse pigmented area anterior to cauda either divided or not, provided with a few scattered hairs, anterior margin very irregular. Cornicles as in apterous viviparous females, provided with two kinds of hairs, as to quality and several lengths, the longest being several times the length of the shortest. Palmer's specimens apparently were not cleared, hence the two kinds of hair on the cornicles was not noted, because of this, cleared specimens will not key to *engelmanniensis* in her key to the genus *Cinara* in "Aphids of the Rocky Mountain Region."

Morphotype alate viviparous female, deposited in the United States National Museum. Taken on *Picea engelmanni*, July 15, 1954, South of Glade Park, Colorado.

Cinara costatus (Hartig)

Hartig described a species of *Lachnus* under the name *costatus* on

page 645 of his little known paper published in 1839. The date of publication of this paper is as a rule given incorrectly as 1837 in literature. I am not aware of this name being recorded in Aphid Literature, although Hartig himself alludes to it in his 1841 paper, in which he gives the name *costata* to the same species, placing it this time in the genus *Schizoneura*, with the remark that his earlier placement was not correct. *Lachnus costatus* Hartig is a homonym and a synonym of *Cinara costata* (Z). It is strange that Dr. Börner did not record Hartig's first name in his last work. I suspect that he never saw the paper in which it was published, for we had correspondence over another name, published in the same paper, of which he was not aware.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW ROCK SQUIRREL (*CITELLUS VARIEGATUS*) FROM THE GREAT BASIN WITH CRITICAL COMMENTS ON RELATED SUBSPECIES

By Stephen D. Durrant and Richard M. Hansen

When Howell (North Amer. Fauna, 56:1-256, 1938) reported upon rock squirrels (*Citellus variegatus* (Erxleben)) from Utah, Nevada, Arizona and Colorado, he gave a divided range (*op. cit.*:137) for both *Citellus variegatus grammurus* and *Citellus variegatus utah*. For *C. v. grammurus*, he indicated that one isolated population occurred in the Arizona-Utah-Nevada corner and that it was separated from the main range of this subspecies by the Colorado River. Likewise, one small isolated population of *C. v. utah* was recorded from the Kaibab Forest, which was far removed from the main range of this subspecies in central Utah. Hall (Mamm. of Nevada, Univ. California Press, Berkeley, California, 310-313, 1946), in his report upon the mammals of Nevada, agreed with Howell that rock squirrels from Nevada were referable to the subspecies *C. v. grammurus*. Hall had more specimens, than did Howell, which established a larger range in Nevada for these animals. Kelson (Univ. Utah Biol. Series XL No. 3:29-30, 1951) extended the range of *C. v. grammurus* in Utah, to include all of south-central and southeastern Utah as far north as the Book Cliffs in Carbon County. Durrant (Mamm. of Utah, Taxonomy and Distribution, Univ. Kansas Publs., Mus. Nat. Hist., Vol. 6:118-120, 1952) agreed essentially with Kelson, differing only in the assignment of the specimens from Carbon County. Hall and Kelson (Univ. Kansas Publs., Mus. Nat. Hist., Vol. 5, 26: 346, 1952) employed the name combination *Spermophilus variegatus grammurus* (Say) for the two specimens from the Kaibab Plateau, 1 from Big Springs and 1 from Kaibab Forest (only 1 examined) which were formerly assigned by Howell to *C. v. utah*. Their decision was based upon color and the geographic occurrence of these specimens.

With the acquisition of additional specimens from critical areas, it became apparent that animals of this species from the aforementioned

areas needed additional study and evaluation. This paper makes different subspecific assignments than were formerly recognized and describes and names one hitherto unrecognized subspecies.

Unless otherwise noted, measurements and diagnostic characters are from adults only. An adult specimen was considered to be one having the permanent molariform teeth fully erupted and showing wear. Males and females were included together in samples because the degree of morphological difference between the sexes was insignificant within the age class studied. Capitalized color terms are those of Ridgway (Color Standards and Color Nomenclature, Washington, D. C., Privately Published, 1-44, 1912).

In the course of this study the senior author examined all specimens that were assigned to *C. v. grammurus* and *C. v. utah* by Howell (*op. cit.:* 1938). In addition, we have studied 216 specimens. Unless otherwise indicated, specimens are in the Museum of Zoology collections, University of Utah.

For the loan of comparative materials, we are indebted to the following:

John Aldrich and Viola S. Schantz, U. S. Fish and Wildlife Service, U. S. National Museum, Washington, D. C.; J. Kenneth Doutt and Caroline A. Heppenstall, Carnegie Museum, Pittsburgh, Pennsylvania; Seth B. Benson, Museum of Vertebrate Zoology, University of California, Berkeley, California; Thomas R. Howell, Dickey Collection, University of California at Los Angeles, Los Angeles, California; Alfred M. Bailey and Albert C. Rogers, Denver Museum of Natural History, Denver, Colorado; Vasco M. Tanner and C. Lynn Hayward, Brigham Young University, Provo, Utah. For assistance in this project the junior author (U. S. Public Health Service Fellow) is indebted to the U. S. Public Health Service, Microbiological Institute.

The new subspecies from the Great Basin may be known as:

Citellus variegatus robustus subsp. nov.

Type.—Female, adult, skin and skull, No. 7668, Museum of Zoology, University of Utah; Pass Creek, Deep Creek Mountains, 8000 feet, Juab County, Utah; June 5, 1950; collected by R. M. Hansen; original no. 188. *Range.*—Central Nevada as far south as Lincoln County and central Nye County; Deep Creek Mountains of western Utah.

Diagnosis.—Size large (see measurements). *Color.*—Upperparts variegated, mixture of white, black, brown and near Cinnamon-Buff, roughly divisible into 3 regions; head darkest owing to greater admixture of brownish-black, eye-ring creamy white; forepart of back, predominantly white; underfur blackish-brown; overhair blackish-brown basally, followed by white band and tipped with black; hindpart of back, near Cinnamon-Buff, hairs brownish basally, followed by band of Cinnamon-Buff, brown distally; upper surfaces of hind legs, axillary region, upper and lower surfaces of front legs, throat and inguinal region Cinnamon-Buff; front and hind feet Pinkish Buff; upper and lower surfaces of tail predominantly same as posterior surface of back; subterminal dark band darker distally; hairs of tail 6 banded, basal band Light Buff, followed by reduced Fuscous Black, followed by Light Buff, followed by blackish, then white, and inconspicuously tipped with black. *Skull.*—Massive, robust, convex dorsally, size large (see measurements); nasals long, flared

distally, constricted posteriorly; proximal ends of nasals extend posterior to the frontopremaxillary suture; rostrum long and narrow; interpterygoid fossa narrow; pterygoid hamulae long; postorbital processes large, strongly recurved and attenuate; postorbital breadth narrow; zygoma robust and moderately spreading; lambdoidal ridge well developed and flaring beyond vertical plane of occiput; palate concave; bullae relatively small; frontals convex dorsally.

Comparisons and remarks.—Comparisons of specimens of *C. v. robustus* with topotypes and near topotypes of *C. v. grammurus* and *C. v. utah* shows the former to differ as follows: Skull larger in all measurements taken, except the postorbital breadth which averages smaller; nasals more flared distally and more constricted posteriorly; posterior ends of the nasals project posterior to the fronto-premaxillary suture rather than being on the same plane; supraorbital foramina larger; supernuchal crest projects posterior to vertical plane of the occiput rather than being on same plane as occiput; postorbital processes longer, more recurved and narrower proximally than in *C. v. grammurus;* postorbital processes resemble those of *C. v. Utah* but differ in being narrower proximally; frontals straight or convex dorsally as opposed to moderately concave; tympanic bullae smaller than in *C. v. grammurus;* tympanic bullae similar in size but more inflated ventrally than in *C. v. utah;* jugular formina divided in *C. v. robustus* and *C. v. utah,* but not divided in *C. v. grammurus.*

When skull measurements and ratios of skull measurements are treated statistically (see Table 1) the following is noted:

Length of nasals.—There is no significant difference between topotypes and near topotypes of *C. v. utah* and *C. v. grammurus.* The subspecies *C. v. robustus* is extremely significantly different from both *C. v. grammurus* and *C. v. utah.*

Height of foramen magnum divided by the width.—There is no significant differences between specimens of *C. v. robustus* and *C. v. utah.* Specimens of *C. v. grammurus* are extremely significantly different from both those of *C. v. utah* and *C. v. robustus.*

Postorbital breadth divided by the basilar length of Hensel.—The difference between specimens of *C. v. robustus* and *C. v. utah* is extremely significant; between those of *C. v. robustus* and *C. v. grammurus* highly significant. There is no significant difference between specimens of *C. v. grammurus* and *C. v. utah.*

Interorbital breadth divided by the postorbital breadth.—Specimens of *C. v. robustus* are extremely significantly different from those of *C. v. utah* and are highly significantly different from those of *C. v. grammurus.* The difference between specimens of *C. v. grammurus* and *C. v. utah* is suggestive.

Animals of the three subspecies vary in color from any given locality, and once the limits of coloration are understood certain characteristics (e.g. dappling, rump patch, mantle) are recognizable that are useful in making subspecific designations. Apparently former workers failed to recognize the critical color patterns which were obscured within a wide range of variation. In our attempt to assign animals to subspecies, we were obliged to use the extremes in color variations as well as the average color within each population of these rock squirrels. In this manner, we were able to discern patterns in some cases that were not a result of individual variation and others that resulted from individual variation.

In order to evaluate the color patterns of the latter kind, we were obliged to use the extremes in variation rather than assuming that any one population had a particular "typical color." In this way the understanding of color becomes more meaningful and the animals can then be grouped more naturally. For example, in animals from small local populations, the color of the rump patch resembles that of the surrounding terrain. Therefore, specimens from areas of red soils possess reddish rump patches, irregardless of their subspecific assignments and certain members of all the subspecies appear to demonstrate convergence in this character. Some specimens assigned to *C. v. grammurus* from the red soils of southeastern Utah have markedly redder rump patches than do specimens of the same subspecies taken from lighter colored soils only a few miles distant. Likewise, some specimens of *C. v. utah* from the southern and eastern limits of its range, from reddish soils are redder on the rump than are other specimens of this subspecies.

A constant color pattern found both in specimens of *C. v. robustus* and *C. v. utah* is the dappling of the mantle, but it is more marked in specimens of *C. v. utah*. In all series studied, immature specimens were noted to have more dappling than did adults. Topotypes and near topotypes of *C. v. grammurus* did not show this dappling in any specimens examined by us. Some dappling is present in some specimens from areas of intergradation between *C. v. grammurus* and *C. v. utah*. The light color of the bands of the hairs of the mantle are brownish-yellow in topotypical and near topotypical specimens of *C. v. grammurus*, but are white or nearly so in both *C. v. robustus* and *C. v. utah*. The color underlying the mantle is greyish in specimens of *C. v. grammurus* and dark brown in those of *C. v. utah*. In specimens assigned to *C. v. robustus* the underfur of the mantle is blackish and is darker than in the majority of specimens of *C. v. utah*. In a superficial examination the color of the mantle of specimens of *C. v. robustus* can be confused with those of *C. v. grammurus*. On critical examination, however, it is noted that the overhair of the mantle in specimens of *C. v. robustus* is tipped with white rather than yellow as in *C. v. grammurus*.

The color of the rump patch in specimens of *C. v. utah* includes many shades of brown and this color is relatively variable, especially within topotypical specimens. Specimens of both *C. v. robustus* and *C. v. grammurus* have a lighter colored rump patch than do those of *C. v. utah*. Specimens of *C. v. robustus*, however, have a yellowish colored rump patch and those of *C. v. grammurus* are light brown. The rump patch is less variable in color in specimens of *C. v. robustus* and *C. v. grammurus* than in *C. v. utah*. The darker color of the rump patch which is characteristic of specimens of *C. v. utah* is approached only by some extremely dark specimens of *C. v. grammurus* and by intergrades between *C. v. utah* and *C. v. grammurus*. This darkening in specimens of *C. v. grammurus* is at best no darker than the light colored extremes of *C. v. utah*.

In the overall color, there is a wider range (from dark to light) in topotypes of *C. v. utah* than in any other population studied. The lightest topotypes of *C. v. utah* are darker than the darkest topotypes of *C. v. grammurus*, and are no lighter than the lightest topotypes of *C. v. robustus*.

Distribution and subspecific assignments.—Specimens of *C. variegatus* from extreme southern Nevada (Clark County) are darker than

those of *C. v. robustus* and the darkest extremes are darker than the lightest topotypes of *C. v. utah*. The color of the rump patch is unlike that of specimens assigned to *C. v. grammurus* and resembles specimens of *C. v. utah*. These specimens from Clark County are dappled nearly to the same degree as are specimens known to belong to *C. v. utah*. The color of the mantle is intermediate between the color of specimens of *C. v. utah* and *C. v. robustus*, but tends to be more like that in specimens referable to *C. v. utah*. The light bands of the mantle are mostly white and are unlike those of specimens of *C. v. grammurus*. The diagnostic skull characters are intermediate between those of *C. v. utah* and *C. v. robustus*, but are predominantly closer to the former. All things considered, it is deemed advisable to refer the specimens from Clark County, Nevada, to *C. v. utah*.

Five specimens from Trumbull Mountains, Arizona, were referred by Howell (*op. cit.*:145) to *C. v. grammurus*. He (*op. cit.*:147) also referred a specimen from Big Springs, Kaibab Plateau to *C. v. utah*. Hall and Kelson (*op. cit.*:346) referred this same specimen to "*Spermophilus variegatus grammurus*" on the basis of color and distribution. Howell (*op. cit.*:144) also referred two specimens from the Phantom Ranch, Arizona, to *C. v. grammurus*. With these specimens and topotypes of *C. v. utah*, *C. v. grammurus* and *C. v. robustus* at hand, on the basis of color, we assign all of these specimens, with no reservations, to the subspecies *C. v. utah*. Diagnostic skull characters also show that these specimens are clearly of that subspecies, and hardly show any intergradation with other subspecies. Hall and Kelson (*op. cit.*:346) were influenced by the light color of the rump patch of the specimen from Big Springs, but did not consider that this light colored rump patch is darker than that in the lightest topotypes of *C. v. utah*. Specimens from the Phantom Ranch are to us indistinguishable from the aforementioned specimen. It is noteworthy that animals from the Arizona Strip all possess the dappling that is not found in typical *C. v. grammurus*.

Specimens from south of the Colorado River in Arizona differ from those of *C. v. utah* in essentially the same manner as do topotypical specimens of *C. v. grammurus*. In specimens from this region, however, there is considerable variation. Some specimens may have no dappling while others may be heavily dappled. The dappled specimens from south of the Colorado River are lighter colored and more sparsely dappled on the anterior part of the mantle than in specimens of *C. v. utah*. In specimens of *C. v. utah* the dappling is generally sparse but the spots are larger in size. When specimens of *C. v. grammurus* from this region are dappled, dappling is of a vermiculated rather than a spotted type.

Specimens from farther up the Colorado River drainage in Utah show intergrading characters between *C. v. utah* and *C. v. grammurus*. While the Colorado River has not been a complete barrier to interbreeding, it has been relatively effective, especially in southern Utah and northern Arizona. Specimens from these areas are easily assigned to their respective subspecies even though they show some intergradation.

Specimens from east of the Colorado River in San Juan and Grand counties, Utah, resemble the topotypical specimens of *C. v. grammurus*, especially in cranial details. They show only slight degrees of intergradation with *C. v. utah*.

Specimens from Florence Canyon, Grand County, Utah, on the west side of the Colorado River, are quite typical of the subspecies *C. v. utah*.

Noteworthy is the fact that some of these specimens have a distinctly reddish rump patch that is characteristic of animals from red soils. Specimens from Woodside, Emery County, Utah, are also typical of *C. v. utah*, while specimens from the vicinity of Greenriver, Emery County, Utah, show some intergradation between *C. v. grammurus* and *C. v. utah*. With one exception, the remaining specimens available to us from elsewhere in southern and central Utah, north of the Colorado River, indicate that they are distinctly of the subspecies of *C. v. utah*. This aforementioned exception is a population from western Sanpete, eastern Juab and northern Utah counties. These specimens resemble *C. v. utah* in color, but in some skull characters they are intermediate between *C. v. robustus* and *C. v. utah*. This population is far removed from the known range of *C. v. robustus* and the area intervening is not known to harbor rock squirrels. The retention of some characters of *C. v. robustus* by these specimens on the eastern mainland of Pleistocene Lake Bonneville indicates that at one time they may have intergraded freely across the Lake Bonneville Basin.

Specimens from St. George, Washington County, Utah, are quite typical of *C. v. utah*, but do have reddish rump patches when taken on red soils. Rock squirrels occur throughout western Beaver and western Iron counties, Utah, but no specimens are available to us at present. When specimens are known from these areas, we suspect that they will prove to be intergraded between *C. v. robustus* and *C. v. utah*.

Summary.—As a result of our study we find the ranges of the following to be:

1.—*C. v. grammurus*—asindicated by Howell (*op. cit.*:142) except that no specimens of this subspecies occur west and north of the Colorado River in Utah, Arizona and Nevada.

2.—*C. v. utah*—as indicated by Howell (*op. cit.*:146) and in addition southwestern Utah, northwestern Arizona and southeastern Nevada, north and west of the Colorado River. Animals from these latter regions were formerly assigned to *C. v. grammurus*.

3.—*C. v. robustus*—restricted to the Great Basin in western Utah and central Nevada.

Specimens examined.—It is deemed needless repetition to list all specimens examined, since most of them have already been reported in the literature. Only those specimens from critical areas are listed.

C. v. robustus.—Total, 19, from: Utah.—*Juab County:* Pass Creek, Deep Creek Mountains, 8000 ft., 2; Birch Creek, Deep Creek Mountains, 7600 ft., 1. Nevada (M.V.Z.).—*Nye County:* 2 mi. S. Oak Spring, 5800 ft., 1; Haws Canyon, 7000 ft., 1; 5 mi. W White Rock Sp. seventy-three, Belted Range, 1; 2 mi. E. Silverbow, 6900 ft., Kawich Mountains, 1; Quinn Canyon Mountains, 6 mi. NE x E of Nayala, 7000 ft., 1. *White Pine County:* Cherry Creek, 6800 ft., 6; Baker Creek, 4. *Lander County:* Kingston Canyon, 6350 ft., 1.

C. v. utah.—Total, 59: Nevada.—Clark County (D. C.): Sheep Mountains, 8500 ft., 1; Cedar Basin, 3500 ft., 4; Charleston Park, 8000 ft., 1; Charleston Mountains, 10. Arizona.—Mohave County (U. S. N. M.): Trumbull Spring, Trumbull Mountains, 3; 3 mi. S. of Trumbull Spring, Trumbull Mountains, 1. *Coconino County* (U. S. N. M.); Big Spring, above Ryan, Kaibab Plateau, 1; Phantom Ranch, 2. Utah.—*Uintah County*: along Green River, 15 mi. SW Ouray, 4500 ft., 1 (C. M.). *Carbon County*: 3½ mi. SE Price, 5547 ft., 1; Nine Mile Creek, 1 mi. W

Nutters Ranch, 1 (C. M.). *Grand County*: Mouth of Florence Canyon, 35 mi. N. Greenriver, 9 (C. M.); 13 mi. SE Thompsons, Arches Nat. Monument, 1 (C. M.). *Emery County*: 7 mi. N Greenriver, 4100 ft., 4; Pump Station, 4 mi. N Greenriver, 4100 ft., 3; Woodside, 2 (B. Y. U.). *Wayne County*: Ekkers Ranch, Robbers Roost, 25 mi. E Hanksville, 6000 ft., 1; Fruita, 1 (B. Y. U.). *Garfield County*: Antimony, 2; Highway 23, 5 mi. NW Escalante, 5700 ft., 1; ½ mi. N Escalante, 5300 ft., 1; Henrieville, 1 (B. Y. U.); Moki Tanks, Circle Cliffs, 1 (B. Y. U.). *Washington County*: East Rim, just outside Zion Nat. Park, 6500 ft., 1; Zion Nat. Park, 4; St. George, 1 (B. Y. U.).

C. v. grammurus.—Total, 30: UTAH.—*San Juan County:* La Sal Mountains, 2 (B. Y. U.); 18 mi. E Monticello, 1; 5 mi. W Monticello, 2 (C. M.); 13 mi. SE Moab, 1 (C. M.); Moab, 4500 ft., 3; Mouth of Nigger Bill Canyon, E side of Colorado River, 4 mi. above Moab Bridge, 3. *Grand County:* 3 mi. W Warner R. S., 8000 ft., 1; Castle Valley, 18 mi. NE Moab, 6000 ft., 1. ARIZONA (U. S. N. M.).—*Coconino County*: Anderson Mesa, 1; Apache Maid Mountain, 3; Baker Butte, 2; Grand Canyon, 8. *Mohave County*: Beals Spring, 1; Big Sandy Creek, 2.

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Table 1.—Statistical treatment of skull measurements and ratios.

Length of Nasals:

C. v. grammurus (topotypes and near topotypes)

sample size	14
average	21.1 mm
standard deviation	1.05

C. v. utah (topotypes and near topotypes)

sample size	22
average	20.7 mm
standard deviation	1.05

C. v. robustus

sample size	7
average	23.1 mm
standard deviation	1.19

t values

C. v. utah

t = 4.52 t = 0.82

C. v. robustus—C. v. grammurus

t = 3.39

Height of foramen magnum divided by the width of foramen magnum:

C. v. grammurus (topotypes and near topotypes)

sample size	15
average	81.6
standard deviation	5.03

C. v. utah (topotypes and near topotypes)

sample size	21
average	73.9
standard deviation	5.74

C. v. robustus

sample size	7
average	74.7
standard deviation	3.40

t values

C. v. utah

t = 0.44 t = 4.24

C. v. robustus—C. v. grammurus

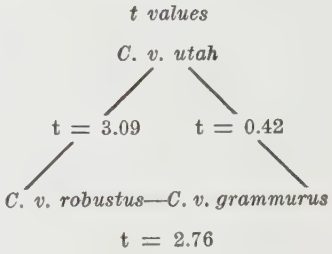
t= 3.78

Postorbital breadth divided by the basilar length of Hensel:

C. v. grammurus (*topotypes and near* topotypes)
- sample size 14
- average 36.3
- standard deviation 1.83

C. v. utah (topotypes and near topotypes)
- sample size 21
- average 36.6
- standard deviation 2.37

C. v. robustus
- sample size 7
- average 34.3
- standard deviation 1.41



Interorbital breadth divided by the post orbital breadth:

C. v. grammurus (topotypes and near topotypes)
- sample size 15
- average 81.5
- standard deviation 3.70

C. v. utah (topotypes and near topotypes)
- sample size 22
- average 79.3
- standard deviation 3.74

C. v. robustus
- sample size 7
- average 86.4
- standard deviation 4.26

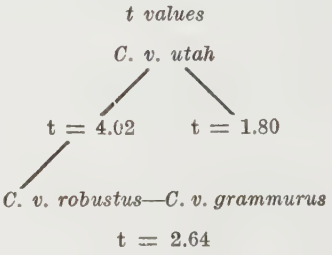


Table 2. Cranial measurements of *C. v. utah*, *C. v. robustus* and *C. v. grammurus*

	C. v. utah				*C. v. robustus*				*C. v. grammurus*			
	No.	*Av.*	*min.*	*max.*	*No.*	*Av.*	*min.*	*max.*	*No.*	*Av.*	*min.*	*max.*
Length of basioccipital	22	8.5	7.8	9.1	7	8.9	8.5	9.5	15	8.7	8.3	9.1
Occipitonasal length	22	59.2	54.7	61.9	7	62.0	58.9	63.7	13	60.1	57.9	62.6
Basilar length of Hensel	22	47.8	44.0	49.9	7	50.2	48.0	51.5	14	48.1	46.2	49.9
Length of nasals	22	20.7	18.9	21.9	7	23.1	21.0	24.0	14	21.1	19.4	22.7
Zygomatic breadth	19	37.1	35.2	39.3	7	38.3	36.3	39.5	11	37.5	36.3	39.2
Interorbital breadth	22	13.8	12.5	15.4	7	14.9	14.5	15.6	15	14.3	13.4	15.4
Postorbital breadth	22	17.4	16.5	18.5	7	17.2	16.9	17.9	15	17.5	16.1	18.7
Temporal breadth	21	24.3	23.4	25.3	7	24.6	23.8	25.0	15	24.1	23.1	25.2
Length of rostrum*	22	20.4	19.0	22.3	7	21.7	20.0	23.3	14	19.9	18.0	21.1
Alveolar length of upper cheek teeth	22	11.5	11.1	12.2	7	11.7	14.4	11.9	16	11.8	11.2	12.7
Width of rostrum**	22	13.8	12.3	15.7	7	14.0	13.3	14.9	16	13.9	12.2	14.8
Width of foramen magnum	21	9.4	9.0	9.9	7	9.4	9.2	9.6	14	8.8	8.4	9.6
Height of foramen magnum	22	6.9	6.3	7.8	7	7.0	6.8	7.4	14	7.1	6.8	7.9
Postpalatal length	22	19.6	18.3	21.0	7	20.9	19.5	21.9	14	19.7	18.8	20.9

Measurements are taken from topotypes and near topotypes of *C. v. utah* and *C. v. grammurus*. The measurements of *C. v. robustus* are taken from the type and also from specimens from various other localities within the range ascribed to *C. v. robustus*.

*Length from junction of premaxillary-maxillary-frontal to distal end of nasals.

**Taken across rostrum at middle of the anterior palatine foramina.

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A NEW SPECIES OF *SCHIZOLACHNUS* (APHIDAE)

F. C. Hottes, E. O. Essig and G. F. Knowlton

The interesting species described herewith was sent in for determination from Idaho, Oregon and Washington within a period of three weeks. It may be distinguished from other species of the genus, at once by the peculiar bent condition of most of the tibial hairs.

Schizolachnus curvispinosus n. sp.

Apterous viviparous female.

Size and general color.—Length of cleared specimens from vertex to end of anal plate varying from 2.14-2.21 mm. Color in life not recorded, probably a dusky green. Cleared specimens have the head and thorax dusky black, abdomen dusky, some specimens have the dorsum of the abdomen with numerous small irregular shaped brownish spots, when present these are for the most part arranged in irregular transverse rows. Commonly one or more spots in a row are more or less confluent. Dorsum of abdomen with short thick spine-like hairs, these arise from the pigmented spots when they are present. First and second antennal segments blackish, remaining antennal segments dusky. Pro and mesothoracic femora black except for a very short distance near base which is pale. Metathoracic femora with basal one fourth pale, remainder black. Tibiae and tarsi uniform black.

Head and thorax.—Antennal segments with the following lengths: III .27-.30 mm., IV .13 mm., V .11 mm., VI .07-.11 +.03 mm. Third and fourth antennal segments without sensoria, fifth segment with primary and one secondary sensorium. Unguis of sixth antennal segment short and stubby. Antennal hairs very sparse, hair on posterior margin of third almost absent, all hairs coarse, the longest about one fourth longer than width of segment. Rostrum reaching to metathoracic coxae. Pro and mesothoracic femora short. Length of metathoracic femora .92 mm. Hair on metathoracic femora coarser than that on anterior femora. All tibiae with hair equal to width of segment, or but little longer, when longer, the ratio of length to width is six to five.

Most tibial hairs bent about one fourh of their length from the base, so that the length beyond the bend is more or less parallel to the tibia. Length of hind tibiae 1.57 mm. Length of hind tarsal segments .07 and .27 mm.

Abdomen.—Cornicles with openings acentric within the very irregular pigmented area, which measures about .07 mm. across shortest diameter. Hair on ventral suface of abdomen longer, finer and more numerous than on dorsal surface.

Oviparous female.

Length from vertex to end of anal plate varying from 2.71-3.07 mm. Color most likely similar to that of viviparous female, and with similar spots on the dorsum of the abdomen. Length of antennal segments as follows: III .35 mm., IV .16 mm., V .14 mm., VI .03+.1 mm. Sensoria as in viviparous female. Antennal hair slightly longer than that of viviparous female, the ratio of length to width of segment being five to three. Hind tibiae varying from 1.71-1.91 mm. Length of hind tarsal segments .1 and .30 mm. Sensoria on hind tibiae very numerous, and very tuberculate.

Alate male.

Specimens of the male are too poor to describe. The hairs on the tibiae are much longer than those of the known females, the bend is less pronounced, and absent in some.

Holotype apterous viviparous female, Coeur d' Alene, Idaho, Sept. 12, 1954. Host, *Pinus ponderosa,* David McComb collector. Morphotype oviparous female, Hurricane Creek, Wallowa County, Oregon, Oct. 11, 1941. J. D. Vertrees collector. Specimens are also known from Palouse, Washington, May 29, 1954, and Yosemite National Park, California on *Pinus Ponderosa* July 11, 1939. E. O. Essig. Both types have been deposited in the United States National Museum. In common with the other described species of the genus, this species feeds on the needles.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW SPECIES OF *CINARA* AND NOTES ON TWO RECENTLY DESCRIBED SPECIES (APHIDAE)

F. C. Hottes and E. O. Essig

A number of years have passed since the species described herewith was first taken, it seems desirable that it be described and given a name.

Cinara curtihirsuta n. sp.

Alate viviparous female.

Size and general color.—Length of cleared specimens from vertex to end of anal plate varying from 3.57-3.71 mm. Color in life not known, probably some shade of dusky green, but not dark. Head and thorax light dusky brown, abdomen pale, cornicles light dusky, cauda and anal plate the same. First and second antennal segments concolorous with head, third segment yellowish at base, dusky beyond middle, fourth, fifth and sixth antennal segments dusky, darker in color than apex of third. Femora yellowish with apical region more or less dusky brown. Tibiae of pro and mesothoracic legs dusky at base, followed by a yellowish region to middle, remainder of tibiae dusky. Metathoracic tibiae dusky brown throughout, tarsi the same. Dorsum of abdomen with four rows of small wax pore plates.

Head and thorax.—Length of antennal segments as follows: III .51-.57 mm., IV .14-.17 mm., V .24-.29 mm., VI .11+.029 mm. Secondary sensoria distributed as follows: III seven, presence of primary sensorium on this segment questionable, IV one, pirmary sensorium present, V similar to four. Hair on antennae sparse, on third segment for the most part equal or subequal to width of segment, set at an angle of sixty or more degrees. On third antennal segment the sensoria are very large, almost as wide as segment, arranged in a straight row, and very tuberculate. Rostrum about long enough to reach metathoracic coxae, but no rostrum is in such a position that its length can be accurately determined.

Last three segments of the rostrum with the following lengths: .20, .17, .06 mm. Lateral lobes of thorax almost free from hair, the few present are located along the median border. Median posterior lobe of thorax with few hairs. Media of forewings twice forked, second fork mid way between first fork and margin of wing. Radial sector, cubitus and anal vein brown, much darker than radius. Stigma dusky, almost uniform in width with the apex truncate. Hind femora 1.50 mm. rather slender, hair on this segment fine, shorter than width of segment and upstanding. Hind tibiae 2.43-2.71 mm. Hair on hind tibiae fine set at an angle of about forty-five degrees, rather numerous, shorter than width of segment not much longer than .028 mm. Hair on ventral surface of

first tarsal segment number about nineteen, this segment is about .085 mm. in length, the second segment of the tarsus is from .26-.29 mm in length.

Abdomen.—Hair on dorsum of abdomen very sparse, very far apart, very fine, and less than .014 mm. in length. Hair on ventral surface of abdomen abundant, long and fine. Cornicles with base measuring about .29 mm. across, outer margin of cornicle base almost free from hairs, hairs for the most part limited to constricted area, but not numerous. Cauda almost free from hairs, except area near posterior margin. Pigmented spot anterior to cauda divided, rather narrow, and characterized by three hairs on one side and four on the other.

Holotype alate viviparous female, deposited in the collection of E. O. Essig. *Host Abies concolor.* Taken July 7, 1937, at Swamp Lake, Yosemite National Park, California, by E. O. Essig. This species has nothing in common with other species of *Cinara* described from *Abies,* the short hair on the antennae and tibiae, and the minute and sparsely placed hairs on the dorsum of the abdomen distinguishing it at once. In Palmer's key to the genus *Cinara* in "Aphids of the Rocky Mountain Region" this species may be keyed to couplet eight. The antennae are about 1 mm., but III is not shorter than .50 mm. The antennae are too short for *flexilis. C. curtihirsuta* differs from *atra* by sensoria, nature of hair on cornicles, shorter hairs on ventral surface of first tarsal segment and most likely by the color not being black.

A. E. Michelbacker took alate specimens of this species at Lake Tahoe, California July 26, 1937 on *Abies concolor.*

Cinara osborni K.

Cinara alticola H & E. New synonymy.

Dr. Knowlton lists the host of *osborni* as *Pseudotsuga mucronata.* We question the correctness of this statement. Specimens of this species were taken a number of times this past summer, all on *Abies lasiocarpa.* Palmer lists the host as *P. taxifolia.* Both *taxifolia* and *mucronata* are synonyms of *Pseudotsuga menziesii.*

Cinara hirta H & E

When this species was described we had no information as to the host species. This past summer it was determined that the host of *C. hirta* is *Abies concolor. C. osborni* and *C. hirta* are very closely allied, it is interesting to note that their host species also differ, but belong to the same genus.

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PROCEEDINGS
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NEW THYSANOPTERA, PRINCIPALLY FLORIDIAN

J. Douglas Hood

Following are described eleven new species of thrips taken in or very close to Florida, mostly during the summer of 1954. The work was supported in part by the U. S. National Park Service through a contract with the Florida State Museum and the Department of Biology of the University of Florida. The success of the work—which brought to 213 the number of species of thrips known from the state and which added immensely to our knowledge of their habitats—was due in large part to the constant help, extended in various ways, by Dr. J. C. Dickinson, Curator of Biological Sciences; Drs. Minter J. Westfall, Jr., and Albert M. Laessle, of the Department of Biology; Mr. William M. Dunson, Superintendent of the Conservation Reserve at Welaka, Florida; and Dr. Erdman West, of the Experiment Station—all of the University of Florida.

Measurements are in microns unless otherwise stated. To save space, the following abbreviations have been used for the most frequently mentioned setae:

Cephalic setae:
ioc., interocellar,
occ., occipital,
po., postocular
poc., postocellar.

Prothoracic setae:
aa., antero-angular,
am., antero-marginal,
ex., coxal,
ep., epimeral,
ml., midlateral,
pm., postero-marginal.

Scirtothrips taxodii, sp. nov.

Very similar to *brevipennis* in that the abdominal terga and sterna are without dark cross-lines and the wings very short, but with antennae and wings much paler, pronotum unshaded, and the head depressed, rather than somewhat bulging, in front of median ocellus.

♀ (macropterous).—Length about 0.8 mm. (distended, 1.0). *Color* yellow, head whitish, prothorax not shaded; antennae with segment I nearly colorless, II orange because of internal pigmentation and only apically very lightly shaded, III-VIII pale yellowish gray, III-V shaded apically, IV and V with pedicels dark; ocellar pigmentation orange-red; legs nearly concolorous with body, very lightly shaded with gray when seen by reflected light; fore wings colorless except for the orange-pigmented

veins and the pale gray anal area. *Head* 84, across eyes 126, across cheeks 115, across base 105, cheeks rounded basally but otherwise nearly straight, sculptured in the usual manner, setae minute and colorless, normally placed. *Eyes* protruding, dorsally 56 long and approximately 35 wide and 56 apart. *Antennae* normal, I 16(23), II 35(23), III 37(18), IV 33(16-17), V 35(16), VI 40(15), VII 8(7), VIII 12(5). *Prothorax* 90, across pronotum 139, sculpture normal, setae dark gray, that at posterior angles 32, others disposed as usual, much shorter; mesothorax 150 across anterior angles; metathorax 195 posteriorly; fore wings 512, chaetotaxy normal. *Abdomen* normal, 209 at segment IV, setae on IX and X usualy distinctly darker than integument, IX with setae 43-47, I on X about 40.

GEORGIA: Decatur Co. (near Reynoldsville, June 9, 1954, J. D. H., 15 ♀'s (including holotype) from *Taxodium distichum* and 1 ♀ adventitious on *Panicum agrostoides.*

Thrips alysii, sp. nov.

Readily known from its North American cogeners which have (1) fore tarsi not toothed, (2) anterior vein of fore wings with only 2 or 3 setae in distal half, (3) body distinctly darkened, at least in abdomen, (4) abdominal sterna without accessory setae and tergum VIII with complete comb, (5) fore wings not colorless at base, (6) antennae nearly uniform dark brown in segments II-VIII, with III nearly or quite three times as long as wide, and (7) head decidedly broader than long, by the somewhat greater width across eyes and the coloration.

♀ (macropterous).—Length about 1.3 mm. (distended, 1.6). *Color* orange-yellow, more deeply so in thorax, this color due to internal pigmentation; head paler anteriorly, pronotum shaded with gray, abdomen darkened in all except last segment or two, terga II-VIII with a narrow dark brown line across base; sides of head, middle of pterothorax, all femora, and the fore tibiae lightly shaded, most of this shading visible only by reflected light; ocellar pigmentation deep red; antennae nearly concolorous with head in segment I, II dark brown, III yellow in pedicel and dark gray-brown beyond, IV-VII nearly uniform dark gray-brown; fore wings grayish brown, the veins slightly darker, a short median pale streak beyond anal area. *Head* 133, across eyes 151, just beyond eyes 140, across cheeks 147, at base 125, with the usual sculpture and chaetotaxy; cheeks evenly convex, strongly serrate. *Eyes* 75, protruding, about 46 wide and about 60 apart. *Antennae* normal, segment I 24(31), II 44(28), III 60(20), IV 50(20), V 41(18), VI 58(17), VII 20(7). *Prothorax* and legs normal, the pronotum 137 long, 179 wide, lightly cross-striate throughout, its major setae dark gray, ml. 33, two pairs at posterior angles 75-77, median of three pairs on posterior margin 29; mesothorax 207 across anterior angles; metathorax 286 posteriorly; fore wings 784, with 3-4+3-4+1+1+1 dark setae on fore vein and about 12 on hind vein. *Abdomen* 286 at segment IV, thoroughly normal, setae on apical segments dark, IX with seta I 117, II 123, III 137, X with seta I 131, II 128.

FLORDA: Chattahoochee, March 20, 1954, Minter J. Westfall, Jr., 10 ♀'s (including holotype), from *Alysium floridana.*

Hoplothrips westfalli, sp. nov.

Allied to *semicaecus* and *testaceus*, but with the head wider across cheeks than long and just equal in length in pronotum, the body unusually short and broad, and the antennal sense-cone formula III 1(2), IV 2(2), instead of III 1(1), IV 1(1).

♀ (brachypterous).—Length about 2.2 mm. (distended, 2.8 mm.). *Color* of head and prothorax yellowish brown, the pterothorax and all of abdomen (excepting tube) yellow, these parts all underlain with nearly opaque orange pigmentation; terga III-VIII each with a brown transverse dash behind antecostal line; tube orange-brown, but yellowish toward apex and tipped with gray; legs and antennae yellow, segment I of latter lightly shaded with brown, apical part of III and all of IV-VIII just perceptibly darkened; setae yellow, terminal ones brownish. *Head* very short and broad, 224 long, 216 across eyes, 213 just behind eyes, 241 across middle of cheeks, 224 near base, 125 wide in front of eyes, frontal costa 23; cheeks convex, nearly smooth, abruptly rounded to eyes, converging to base, with 7 or 8 pairs of short and rather stout setae in anterior three-fifths; dorsal surface cross-striate in posterior fourth; po. long (150), strongly curved, with finely drawn out points, about 207 apart and 35 from eyes. *Eyes* small, formed as in *semicaecus*, about 51 long, 45 wide, and 126 apart. *Ocelli* present, the median one about on a line with anterior margin of eyes. *Mouth-cone* 185, large, heavy, broadly rounded at tip. *Antennae* normal, with last segment lanceolate and narrowed at base; pedicel of IV broad (17), V with pedicel narrower (15); major sense-cones short and straight, III 1(2), IV 2(2), V and VI 1(1); lengths (and widths) of segments, I 56 (55), II 67(41), III 74(44), IV 58(40), V 63(40), VI 58(37), VII 50(30), VIII 53(20). *Prothorax* 224, across coxae 483, almost completely free of sculpture; am. 17, the others long, strongly curved, and very finely pointed, aa. 64, ml. 130, ep. 165, pm. 155, cx. 117; mesothorax 465 across anterior angles, metathorax 462 posteriorly. *Abdomen* 623 at segment IV, very short and broad, IV only 157 long; tube 196, across basal collar 112, subbasaly 106, apically 46, sides nearly straight, terminal setae 130; setae on IX finely pointed, I 225, II 203, III 239.

FLORIDA: Torreya State Park, June 10, 1954, Minter J. Westfall, Jr., and J. D. H., 1 ♀ (holotype), from dead branches. A large and conspicuously different species, unusual in coloration, named after my very good friend, Dr. Westfall, who has collected many fine Floridian thrips.

Hoplothrips minutalis, sp. nov.

Closely allied to *flavicauda**, but differing in the macropterous form from it and all of its close relatives by the presence of one sense-cone,

**Hoplothrips flavicauda* (Morgan); synonym, *H.* (*Trichothrips*) *myceticola* J. C. Crawford (new synonymy). Mr. Crawford based his name on specimens, taken in New Jersey and New York, which he thought were short-winged. However, they were long-winged individuals which had become de-alated. One topotypic paratype, a female, and a topotypic male taken after the species was described, both received from Mr. Crawford, together with 357 additional specimens, some of which were studied many years ago in comparison with Morgan's types, are in my collection.

only, on either surface of segments III and IV of the antennae, and by the brown tube.

♀, forma macroptera.—Length about 1 mm. (distended, 1.2 mm.). *Color* of head, thorax, and abdomen (including tube) nearly uniform blackish brown throughout, tarsi and knees yellowish; antennae nearly concolorous with body, or with the first three segments yellowish; fore wings gray in base of scale, apical three-fourths very lightly clouded and narowly darker along margins, second fourth with a nearly median dark line; major setae brown or gray. *Head* very short and broad, 146 long, 143 across eyes, 159 and broadest across cheeks at posterior margin of eyes, 133 wide near base; cheeks not at all serrate, abruptly rounded to eyes and converging to near base, thence parallel, with about six pairs of minute setae; dorsal surface with a few anastomosing cross-striae at base; po. 60, with finely drawn-out points, about 128 apart and 10 from eyes. *Eyes* normal to group, about 51 long, 45 wide, and 54 apart. *Median ocellus* directed forward from a rounded eminence, its posterior margin about on a line with front of eyes. *Mouth-cone* 89, semicircularly rounded at tip. *Antennae* normal, with last segment lanceolate and narrowed at base; major sense-cones larger and stouter than usual, that on inner surface of IV at least attaining middle of V, formula of III-V 1(1), VI 1(0); lengths (and widths) of segments, I 27(26), II 40(27), III 35(25), IV 30(26), V 34(24), VI 33(21), VII 31(19), VIII 35(13), *Prothorax* 87, across coxae 237, without sculpture; major setae all pointed, the posterior three pairs with their tips finely drawn out, am. 26, aa. 37, ml. 36, ep. 84, pm. 64, cx. 47; mesothorax 249 across anterior angles, metathorax 237 posteriorly; fore wings 854. *Abdomen* 281 at segment IV, tergum I with a pair of pores, II-IX each with a pair of pores and a pair of small setae behind antecostal line; tube 80, across base 54, at apex 27, sides subparallel to first pair of pores, concave for a slight distance behind these, thence straight to tip, terminal setae 70; setae on IX very finely drawn out at tip, I and II about 80, III 96.

FLORDA: Mt. Pleasant, June 12, 1954, J. D. H., 3 macropterous ♀'s (including holotype), from dead Live Oak branches.

NORTH CAROLINA: Waynesville (Lake Junaluska), Aug. 30, 1954, Minter J. Westfall, Jr., 1 macropterous ♀, from dead branches.

Adelothrips rubustus, sp. nov.

Like *juncius* and *pericles*, only, in arrangement of antennal sense-cones and abdominal pores and in the nearly uniform dark color of the body, but with the head widest across basal collar and free of sculpture each side of median line near base, the eyes much longer and wider, the abdomen much shorter, and the tube 0.9 the length of head.

♀ (macropterous, de-alated).—Length bout 2 mm. (distended, 2.5 mm.). *Color* blackish brown, somewhat darker in abdominal segments VII and VIII, with abundant crimson-red internal pigmentation, the tube bright orange yellow but heavily shaded with blackish brown in constricted tip and narrowly so across base; antennae nearly uniform yellowish brown, with base of segment III yellow and pedicels of IV-VI darkened; tarsi yellow, remainders of legs about concolorous with body, tibiae darkest, articulations somewhat paler; major setae yellow. *Head* 309, across eyes 232, just behind eyes 231, greatest width across cheeks

(at middle) 245, near base 238, across basal collar 252, width (and length) in front of eyes 102(23); surface free of sculpture, except at extreme sides; cheeks slightly convex and broadest at middle, tapering slightly to eyes, slightly concave in front of basal collar, broadest across latter, outline serrate, with about seven pairs of short, stout setae arising from minute tubercles; po. 106, straight, knobbed, 183 apart, 37 from eyes. *Eyes* 91, width 74, interval 85, with enlarged facets posteriorly, re-entrant angle deep. *Ocelli* large, 20-24 in diameter, the median one with anterior margin far behind that of eyes, 22 from posterior ocelli, the latter 37 apart. *Mouth-cone* 168, heavy, semicircularly rounded at tip. *Antennae* normal, VII and VIII compactly united, with distinct suture only ventrally; sense-cones normal, rather short and straight, III 1(2), IV 2(2), V and VI each 1(1); segments formed almost as illustrated for *junctus*, I 50(47), II 72(43), III 86(43), IV 74(43), V 71(43), VI 65(38), VII+VIII 81(30). *Prothorax* 168, across coxae 442, surface without sculpture, major setae straight or slightly curved, knobbed, am. 37, aa. 56, ml. 77, ep. 85, pm. 101, ex. 48; pterothorax wider than long; mesothorax 428 across anterior angles, metathorax 444 posteriorly. *Abdomen* 514 at segment III, the segments short (IV-VII 108-112), surface almost free of sculpture, setae mostly knobbed (excepting a long, lateral curved pair at sides of VI and VII, the terminal setae, and those on IX, all of which are very finely pointed); tube 281, about 0.9 the length of head, across basal collar 127, near base 123, at apex 50, sides slightly convex near base, concave just behind basal pores, thence straightly converging to apical constriction; terminal setae 241; segment IX with seta I 280, II 294, III 273.

FLORIDA: Torreya State Park, June 10, 1954, Minter J. Westfall, Jr., and J. D. H., 1 macropterous ♀ from *Magnolia* sp.

Adelothrips bipartitus, sp. nov.

Readily distinguished by the long, slender head, short stout tube, and unique coloration.

♀ (apterous).—Length about 2.3 mm. (distended, 2.6 mm.). *Color* of integument brownish yellow, shaded with gray in abdominal segments VII-IX, the head, thorax, and most of abdomen with a nearly continuous underlying layer of crimson-red pigmentation, but with segment II abruptly pale yellow; tube blackish brown; antennae with segment I about concolorous with head, II and III pale whitish yellow, both lightly shaded at base and III also at apex, IV similarly colored but more heavily darkened in pedicel and apical half, V-VII successively darker because more heavily shaded; femora brown with pale apices, the fore pair darkest, hind coxae and all tibiae and tarsi yellow; setae on head and thorax pale brown, on abdomen yellowish. *Head* 286, elevated along median line, across eyes 190, at posterior angles of eyes 185, across cheeks 199, near base 195, across basal collar 200, length in front of eyes 26, width between eyes and antennae 98, surface lightly sculptured, occipital line fine, basal collar not distinct, cheeks nearly straight but curving abruptly to eyes; po. 95, slender, curved, with finely drawn-out points, 156 apart and 40 from eyes; other setae similar, ioc. and oc. 44, cheeks with about ten shorter pairs. *Eyes* about 66. Ocelli vestigial. *Mouth-cone* 200, very broad and heavy. *Antennae* short, about 1.5 times

the length of head, segments VII and VIII with partial separating suture, I 50(48), II 64(37), III 72(40), IV 63(38), V 56(37), VI 56(34), VII+VIII 70(30); sense-cones long and slender, III 1(2), IV 2(2), V and VI 1(1). *Prothorax* 208, heavy, across coxae 406, surface smooth, setae formed like po., the am., aa., and ex. 53-61, ml. 98, ep. 88, pm. 103; mesothorax 336 across anterior angles, metathorax 329 posteriorly. *Abdomen* 328 at segment V, without distinct sculpture except at base of IX; tube 168, short and stout, with thickened wall, 103 across basal collar, 100 subbasally, 43 apically, evenly tapering in basal two-thirds, thence roundly and more abruptly tapering to a paralel-sided apex, terminal setae 157; IX with setae finely pointed, I and II about 205, III 158.

FLORIDA: Miami, July 29, 1954, J. D. H., 1 ♀ (holotype), from a dead branch.

Sophiothrips* spadix sp. nov.

*New synonymy: (1) *Nanothrips* Faure, 1938 (1 ♀ of type species, determined by Faure, in collection); (2) *Zaxenothrips* J. C. Crawford, 1943. New combinations: (1) *Sophiothrips breviceps* (Faure); (2) *Sophiothrips parviceps* (Faure); and (3) *Sophiothrips peculiaris* (J. C. Crawford).

Readily known from the African *parviceps* (which is the only other dark-colored species of the genus with the head shorter than the tube) by the presence in both brachypterous and macropterous forms of a long sense-cone on the inner surface of the third antennal segment, as well as the much greater size.

♀, forma macroptera.—Length about 1.4 mm. (distended, 1.8 mm.). *Color* blackish brown; tube orange, shaded basally and in constricted apex with gray; antennae largely bright yellow, I and II unshaded, III-V with apical halves gray, VI gray in apical three-fifths except for yellow tip, VII with pedicel yellow and remainder shaded with gray, III dark gray; legs with all coxae, basal halves or more of femora, and all of mid and hind tibiae except ends, blackish brown, their remainders (including trochanters) lemon yellow, but with fore tibiae clouded on upper surface; fore wings light brown, darkest in scale and in a short post-median streak which end at middle of wing. *Head* 143, across eyes 158, just behind eyes 153, across cheeks 160, near base 144, across basal collar 146, width (and length) in front of eyes 75(25), length between eyes and antennae 5; surface wrinkled in slightly elevated ocellar area, thence lightly reticulate medially to shallow occipital groove, this more lightly cross-striate than occipital area, which contains about two anastomosing striae; cheeks very minutely but sharply incised at posterior angles of eyes, perceptibly angulate or toothed just behind, tapering to basal collar, with a few faint serrations; po. short (22), stout, brown, dully pointed, 147 apart, and about 7 from eyes; ioc. 27, similar; mouth-cone 119, rounded at tip; antennae normal, almost as figured for *squamosus*, the sense-cones very similarly formed and disposed, segment I 39(37—), II 51(34), III 54(32), IV 47(32), V 54(30), VI 61(30), VII 37(20), VIII 30(14). *Prothorax* 141, across coxae 336; sculpture much as in *squamosus* but much weaker, absent from a large rounded area each side of middle; setae brown, pointed or nearly so, am. minute, ep. 80, others 22-33; fore legs typical, but al-

most free of sculpture; mesothorax 322 across anterior angles, metathorax 318 posteriorly, their nota sculptured in the usual manner; fore wings 819, without accessory setae. *Abdomen* 319 at segment IV, typical; tube 176, across basal collar 89, subbasal width 84, apical width 31, sides tapering almost evenly to apical constriction, dorsal surface with a few low ridges near base; segment IX with seta I 128, II and III 196; terminal setae 83.

♀, forma brachyptera.—Length 1.3 mm. (distended, 1.7). Color as in long-winged form, but with head and antennae often paler and more yellowish and sense-cones much shorter; prothorax much larger (197 along midline of notum, 374 across coxae).

♂ (brachypterous).—Length about 1.4 (distended, 1.8). Color much as in ♀; head more slender (144 long, 142 wide), po. 51 and 16 from eyes, ioc. 72, both pairs curved; prothorax enormous, 287 long, 444 across coxae, surface smooth, am. 14, other setae long, curved, pointed, aa. 92, ml. 90, ep. 117, pm. 97, cx. 85; fore legs greatly enlarged, without sculpture, their femora with a swelling at middle of inner surface, their tibiae broadened at base; tergum IX of abdomen with a long (21) median spine (not seta) near posterior margin; tube 154; seta I on segment IX 150, II 58, III 170.

FLORIDA: Gainesville, June 13, 1954, J.D.H., 16 macropterous ♀'s (including holotype), 21 brachypterous ♀'s (including morphotype), and 10 ♂'s (including allotype), taken from dead Live Oak branches.

Sophiothrips vorticosus, sp. nov.

Closely allied to *unicolor*, but with the fore tarsi of female not toothed, the femora not pale apically, and the pronotum on either side of middle concentrically roughened.

♀ (apterous).—Length about 0.8 mm. (distended, 1.0). *Color* of head, thorax, and abdomen (including tube) nearly uniform dark brown or blackish brown; all femora blackish brown, their apices not paler; all tibiae and tarsi pale yellow, the former clouded with brown at middle; antennae with segment I light brown and much paler than head, II-VII pale yellow, III overlain with gray in apical third, IV and V similarly darkened in apical two-thirds, VI in all except pedicel, VII shaded laterally and apically, VIII dark gray. *Head* 81, across eyes 107, just behind eyes 104, across cheeks 112, near base 106, across basal collar 110, incised at posterior angles of eyes, abruptly rounded behind incision, and tapering straightly to near basal collar; surface longitudinally rugose in ocellar area, briefly nearly reticulate behind it, remainder with widely-spaced anastomosing cross-striae, the intervals between rugae and between striae not minutely wrinkled; po. light brown, very short (17) and inconspicuous, curved and pointed, 101 apart and 6 from eyes; ioc. similar to po., 17 long and 38 apart; mouth-cones 79, heavy, semicircularly rounded at tip. *Antennae* normal to group, sense-cones short and straight, none on inner surface of segment III; lengths (and widths) of segments, I 20(26), II 39(28), III 34(21), IV 31(26), V 34(27), VI 43(26), VII 23(16), VIII 22(13). *Prothorax* 103, across coxae 234, its surface roughened almost throughout by dots and lines which form two vortexes centered at middle of lateral fourths; setae brown, curved, and pointed, am. 10, aa. 13, ml. 18, ep. 29, pm. 17, cx. 11;

mesothorax 213 across anterior angles; metathorax 204 posteriorly; legs normal, short; fore tarsi unarmed. *Abdomen* 231 at segment V; tube 77, across basal collar 52, sides parallel or somewhat diverging to first pair of pores, thence tapering concavely to tip, which is scarcely constricted, subbasal width 53, apical width 21, terminal setae 40; segment IX with setae I and II 50-53, III 67.

FLORIDA: Homestead, April 6, 1938, Dr. J. Chester Bradley and J. F. Bradley, 2 ♀'s; and July 26, 1940, Dr. J. Chester Bradley, 2 ♀'s (including holotype); all four specimens were taken from dead branches.

Zaliothrips abdominalis, sp. nov.

Unique in lacking accessory wing setae, in the abdominal coloration, and in the form of the tube.

♀ (macropterous).—Length about 1.8 mm. (distended, 2.1 mm.). *Color* of head, thorax, and abdominal segments VIII and IX dark gray-brown, the pterothorax yellowish at middle, tube nearly black but narrowly paler at either end, segments II-V of abdomen bright lemon-yellow, V with a gray cloud occupying median third, VI similarly colored but lightly shaded posteriorly and laterally and with median cloud darker, VII largely dark but yellowish at sides basally; antennae nearly concolorous with head in segments I and IV-VII, II and III yellow, the former shaded with brown in pedicel, III slightly darker apically, IV more yellowish than those beyond; legs with all coxae and basal half of fore femora brown, their remainders clear yellow; fore wings light yellowish throughout, anal area brown; setae yellow or nearly so. *Head* 224, across eyes 168, in front of eyes 83, cheeks 169, near base 150, basal collar very slightly projecting, occipital line distinct, surface smooth except for light cross-striations at base; cheeks minutely serrate; po. 67, 133 apart, 20 from eyes, very finely pointed, other setae minute and colorless. *Eyes* 80, rounded, very slightly protruding posteriorly, where there are a few enlarged facets. *Ocelli* normal, median one with posterior margin slightly in advance of eyes. *Mouth-cone* 93, typical, apex semicircularly rounded. *Antennae* normal, segment VII with partial suture on ventral surface, sense-cones normal in form and disposition; segment I 42(43), II 60(31), III 70(35), IV 67(34), V 66(30), VI 59(27), VII 90(24). *Prothorax* 134, across coxae 316, epimeron largely fused with notum, surface smooth; setae with very finely drawn-out points, aa. minute (13), am. 37, ml. and cx. 48-50, ep. and pm. 108-109; mesothorax 293 across anterior angles, metathorax 284 posteriorly; fore wings 903. *Abdomen* 358 at segment V; tube 176, across basal collar 82, subbasally 77, apically 36, slightly narrowed at basal pores, otherwise tapering straightly to tip, terminal setae 167; segment IX with setae I 190, II 238, III 176, all with extremely fine points.

FLORIDA: Welaka, Aug. 19, 1954, J.D.H., 1 ♀ (holotype), from branches of *Quercus laevis*.

Trichinothrips pusillus, sp. nov.

Unique in having the antero-marginal setae much larger than the antero angulars, both pairs pointed; metanotal setae minute and pointed; and fore wings without accessory setae.

♂ (macropterous).—Length about 0.9 mm. (distended, 1.2). *Color* blackish brown; femora concolorous with body, tibiae somewhat paler and fading to whitish yellow at tip, tarsi pale yellow; antennae slightly paler than head in segments I and V-VII, II and III whitish yellow, II nearly black in pedicel and somewhat shaded along sides, III clouded apically, IV not quite so dark as those beyond; fore wings with anal lobe gray and remainder nearly clear. *Head* 142, across eyes 108, across cheeks 116, at occipital line 103, length (and width) between eyes and antennae 6(56), length in front of eyes 30; cheeks evenly arcuate from base to eyes, broadest at middle, nearly nonserrate; vertex triangular, sloping steeply downward, nearly pointed in front (frontal costa scarcely 4 across and not grooved), sides vertical; dorsal surface with short striae at sides and fine anastomosing ones in front of occipital line, the latter distinct, occipital area almost perfectly smooth; po. 71, long, curved, nearly colorless, slightly dilated apically, 95 apart, and 14-16 from eyes; minor cephalic setae very fine and long, poc. 35, a pair near inner angles of eyes 40, oc. 32; mouth-cone 56, broadly rounded at tip; antennae with segment I 20(33), II 37(23), III 31(22), IV 29(20), V 29(20), VI 26(18), VII 46(17), I very broad at base and with inner margins forming an angle of nearly 180°; sense-cones setiform. *Eyes* 53, width 31, interval 46, narrowed toward front of head. *Ocelli* not large, 9-12 in diameter, median one not overhanging nor directed forward, with posterior margin at level of front of eyes. *Prothorax* 90, across coxae 189, epimeron fused with notum, surface smooth; setae very slender, nearly colorless apically, brown at base, am. 23, aa. about 3 only, both pointed; ml. 78, ep. 61, pm. 90 ex. 38, all of these slightly dilated apically; mesothorax 174 across anterior angles; metathorax 169 posteriorly; mesonotal setae 50, dilated at tip; metanotal setae minute (16), pointed; fore wings 497, normal, without accessory setae, first subbasal seta 53, other 82, both dilated at tip. *Abdomen* 207 at segment III; tube 69, across collar 47, just beyond 48, at apex 27, terminal setae 97 and nearly colorless; segments VIII and IX without a median patch of small setae, IX with seta I 86 and dilated at tip, II and III with finely drawn-out points, 121 and 134, respectively.

FLORIDA: Seahorse Key, July 13, 1954, J. D. H., 1 ♂ (holotype), from dead Live Oak branch. This is the first record of the genus from North America.

Plectrothrips debilis, sp. nov.

Allied to *thoracicus;* but without a spur at tip of middle tibiae; head broader than long and broadest across cheeks; posterior margin of pronotum irregular, weak, invaded by membranous areas, and without a paralleling strengthening line; abdomen gray-brown; male remarkable for its hind tibiae, described below.

♀ (macropterous). Length about 1.6 mm. (distended, 2.0 mm.). *Color* of head, thorax, and abdomen dark brownish gray, with tube bright golden yellow; legs pale yellow, femora shaded with brown; antennae concolorous with body, with bases of segments slightly yellowish; wings pale brownish yellow throughout. *Head* 199, across eyes 189, across cheeks immediately behind eyes 196, across base 168, width

in front of eyes 104; surface without sculpture, occipital line absent, posterior margin weakened; cheeks rounded to base, almost toothed just behind eyes, the latter 70 long; po. 38, with finely drawn-out points, 176 apart, 33 from eyes; median ocellus not flanked by a pair of setae, its posterior margin much in advance of anterior margin of eyes. *Antennae* normal; III-V with sense-cones 1(1), VI 1(0), VII 0(1); lengths (and widths) of segments, I 36(45), II 53(39), III 45(40), IV 40(40), V 44(39), VI 44(35), VII 42(27), VIII 50(19). *Prothorax* with anterior and posterior margins weak, irregular, and invaded by membranous areas, about 160 long and 286 across coxae, surface without sculpture; ep. and ex. about 42, other setae minute; mesothorax 267 across anterior angles, its sternum with anterior margin rather deeply emarginate, lightly sclerotized and little differentiated from the membrane in front, without a margining sclerite; metathorax 291 posteriorly; fore wings 882, with 9 well-separated accessory setae. *Abdomen* 304 at segments IV-V, tergum II with the pair of pores anterior to and mediad of the minute setae; tube 113, with concave sides, 72 across basal collar, 68 subbasally, 32 apically, terminal setae only 57; seta I on IX 72, II 53, III 127.

♂ (apterous.—Length about 1.5 mm. (distended, 1.9 mm.). *Color* yellow, shaded with gray, cheeks very dark; abdomen with tube and posterior two-thirds of segment IX bright yellow, VIII yellow posteriorly; legs and antennae yellow, the latter tinged with brown. *Head* 174, across cheeks 169; cheeks parallel in posterior two-thirds, angulate at anterior third, tapering straightly to the single-facetted eyes; posterior margin weakened. *Prothorax* 196, across coxae 337, anterior and posterior margins weakened as in female; *hind tibiae dilated at apex of inner surface and produced, this thumb-like process bearing the two spurs. Antennae* normal; sense-cones as in female, but much smaller; lengths (and widths) of segments, I 40(49), II 52(38), III 43(39), IV 38(39), V 41(35), VI 41(34), VII 38(27), VIII 48(18).

FLORIDA: Yulee, August 23, 1954, J.D.H., 1 ♀ (holotype) and 1 ♂ (allotype), from under bark of dead oak saplings.

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